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Timber Production Costs

California -- Schedule 4
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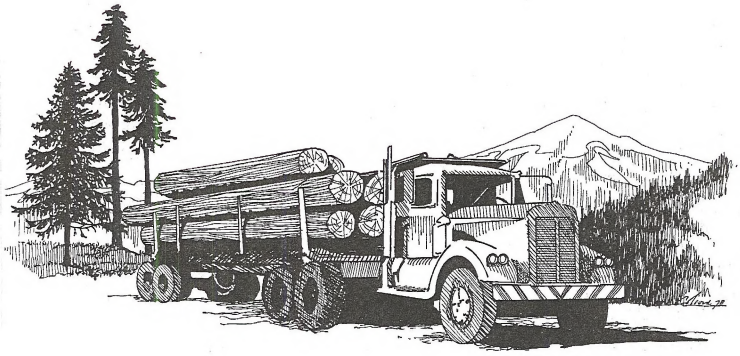

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

#6193110 88008300

TC-1 SD 538.2 .C2 L35 1977

9353.3 - PRODUCTION COSTS

(Schedule 4)

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.01 Purpose. This supplement contains cost data and guidelines used in estimating production costs for timber appraisals. Information in this release is intended for internal use by the Bureau of Land Management in Northern California. Its applicability for use by others or for other than appraising BLM timber tracts in Northern California is not implied. Further, any valid comparisons with empiric or "average" costs must give full consideration to the data sources and assumptions used in this supplement.

.02 Objectives. The schedule is designed to provide a systematic approach for field appraisers to model production costs of the "Average Operator". It presents necessary data to accurately estimate all costs incurred in the conversion process from the standing tree to the finished product. Cost tables and backup data detail provides the appraiser an opportunity to use cost tables directly, when appropriate, or to make adjustments to compensate for special or unusual conditions. Field appraisers must have familiarity with the schedule's composition and its development in order to adequately estimate costs as used in the BLM appraisal concept and reflected in this supplement.

.03 (Reserved)

.04 Responsibilities. Primary responsibilities relating to the development and updating of this facet of the appraisal system include:

A. The State Director is responsible for administration of the appraisal system including:

1. Identification of cost areas needing revisions, modification and updating.

2. Assignment and scheduling of cost data collections analysis and computations.

3. Assembling, publishing and implementation of cost schedules.

B. The Denver Service Center assists in:

1. Developing methodology for obtaining and analyzing cost data and time studies.

2. Producing cost tables by automatic data processing from operating rates and time study data.

3. Reviewing cost data and schedule revisions for technical adequacy.

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C. The District Manager is responsible for preparing accurate appraisals including:

1. Making continuing review of cost schedules and recommending revisions and modifications as needed.

2. Collecting, analyzing and compiling local cost data as assigned.

3. Development of procedures, including backup cost data and cost tables for local conditions to meet appraisal situations unique to an individual district.

4. Testing existing and revised cost schedules for appropriateness to local conditions.

.05 (Reserved)

.06 Policy. Cost data used in this schedule is current to the extent possible. Cost tables are representative of current conditions relative to BLM time studies and within the context of the BLM standard appraisal system. For example, costs in this schedule do not include any profit or risk to the purchaser or his contractors except for materials or services purchased on the local market. Profit and risk allowances in BLM appraisals are based on product selling values, and are considered as a separate component of the appraisal formula. Primary cost items, i.e., wage and machine rates for logging and lumber manufacturing are reviewed at least annually, and updated when a cost change is indicated. Plywood manufacturing costs are changed annually based on industry cost records. Cost tables and related information in this supplement are used to appraise all BLM timber offered for competitive sales; unless, the appraiser finds evidence such costs are not representative of conditions for the individual tract. Adjustments to reflect representative conditions or to cover special or unusual situations are documented in the appraisal file. Limits and bases for making such adjustments are determined by the District Manager and his district forestry staff.

.07 Background. This is the fourth BLM logging cost schedule for Northern California; thus, it is designated "Schedule 4". It is a composite of cost data collected by district and state staffs applied to time studies of various ages conducted by BLM in California. It is issued as a California State Office Supplement as it pertains entirely to California. The release is made up of three components:

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1. Descriptive and procedural text.

2. Cost tables - listed as illustrations

3. Basic cost and time study data - recorded in the appendices.

The basic cost and time study data (appendices) are used in the development of the cost tables (Illustrations). Illustrations and appendices will be revised as cost data is updated and changed. District office manual supplements may be issued as needed to reflect generalized local conditions and record costs common to an individual district.

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.31 Cost Allowance Principles. Each tract of timber has its own characteristics. A timber appraisal must reflect the consideration of these characteristics such as quality and quantity of the timber, features of topography, and tract location relative to road and manufacturing facilities. The schedule furnishes a systematic means to estimate local and specific costs relative to characteristics of each specific tract. Consideration must also be given to the standards for harvesting the tract which the Bureau of Land Management will require in the contract.

A. Tree to Pond Costs. Cover falling and bucking, rigging, yarding and loading, transportation and other contractual costs associated with harvesting the specific tract of timber. Costs concerned with those activities are estimated from this schedule on the basis of field information and factors collected by the appraiser.

1. Procedure. Cost tables for the various activities are compiled from operational rates (computed from wage and machine costs obtained from industry and equipment company sources) as applied to BLM time-cost studies. Time/cost studies for the timber harvesting functions were conducted over the past several years. The studies furnished times required to perform a specific job, including normal delay and lost time on the job. The times related to certain measurable variables affecting rate of production. There are scores of combinations of variables which affect the individual timber harvest function. Many are difficult or impossible to measure. Thus, only measurable variables, considered important which could be isolated and measured are used. Others are accounted for through their inter-relationship with those evaluated and as used in averages for the samples taken.

a. Cost Tables. Cost tables in Illustrations 1 through 6 were prepared through use of production rates determined largely by BLM time studies as noted before. In a few cases where extrapolation of original data produced unrealistically low results, minimum costs were established. Some data were supplied by the Pacific Northwest Forest and Range Experiment Station and BLM records of actual costs. Information used to compute machine ownership rates were furnished by machine manufacturers and operators using the particular piece of equipment. Machine operating costs were calculated from purchase prices and operating expenses furnished by local timber industry sources as well as by manufacturers and distributors of equipment and supplies. Machine rental rates were obtained from published schedules of the Federal Highway Administration and local rental companies. Basic wage rate data were obtained from local timber industry sources and cover union and non-union, company and contract loggers. There were many and varied reliable sources for wage rate adjustment items such as social security, industrial accident insurance, general and administrative cost, etc.

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b. Field Data Accuracy. The necessity for accuracy and reasonableness in obtaining field data by the appraiser is paramount. Laxity in obtaining such data or indiscriminate use of the cost schedule can result in inaccurate answers which are impossible, or at the best, difficult to detect. Cost estimates resulting from the use of this schedule are no better than the field data collected for use in the appraisal.

2. Scope. The cost tables are representative of the normal range of logging and road construction conditions. If the appraiser encounters unusual conditions, he should use the basic data in the appropriate appendices. The basic unit of volume for which costs are expressed is one thousand board feet as described by the Scribner log rule based on taper measurements made at 16' intervals on the stem of the tree.

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32. Falling and Bucking.

A. Falling and Bucking - Clear Cuts or Partial Cuts. Table 1 is designed for use in costing falling and bucking under two general sets of conditions:

Clearcutting operations in which all timber of merchantable size is felled.

Partial cuts (other than commercial thinnings) in which a substantial volume per acre is harvested by -

cutting to a minimum diameter (diameter limit cutting), or

falling trees marked for relatively heavy cuts, including groups selection and shelterwood, as opposed to individual tree marking for sanitation-salvage or light maturity selection cutting.

The table is based on time studies made under varying conditions of brush, weather, slope, etc. These costs reflect cutting in the normal woods run log lengths. Payment to the men falling and bucking the timber where the time studies were conducted was both by the hour and by the thousand board feet. Consequently, average payments have been reduced to an hourly wage basis for application. The following nine variables were analyzed to determine the effect of each on the falling and bucking time:

D.b.h.
Number of 16' logs
Number of 16' logs squared
Number of 16' logs cubed
Gross volume
Slope in per cent
Percentage of top loss
Percentage of bottom and top loss
Merchantable sized stems per acre (includes culls and snags)

However, only number of 16' logs, number of 16' logs squared, percentage of top loss, and stems of merchantable size per acre proved to be significant. A very strong relationship existed between these variables and the time required for falling and bucking a thousand board feet of gross tree volume. Apparently the d.b.h. was not significant in this analysis because of the close correlation between it and the other variables. Thus, the following cost tables show the relationship between cost per MBF gross volume and tree height (number of 16' logs), per cent top loss and stems per acre.

1. Windfall Log Making. Studies in windfall log making indicate that costs are quite comparable to log making in standing timber. Therefore, normal falling and bucking costs should be used for log making in windfall.

B. Unmerchantable Tree and Snag Falling. Table 2 may be used with individual tree diameters b.h. or with an average d.b.h. where necessary. Measurements from which this table was made were taken on the perimeter of the tree, with or without bark. Therefore, to use the table, measurements should be made in the same manner. Where it is necessary to fall trees with a smaller diameter than is listed in the table -- hardwoods, for example -- use the cost of falling unmerchantable snags for the smallest diameter listed.

C. Falling and Bucking. - Commercial Thinnings. Table 3 costs were developed for Bureau of Land Management use from U.S. Forest Service Research Paper PNW-41 (167), Production Rates in Commercial Thinning of Young Growth Douglas-fir, by Thomas C. Adams of the Pacific Northwest Forest and Range Experiment Station.

1. Merchantable Trees. Table 3 uses d.b.h. and number of 16-foot logs to a 5-inch top as variables. This is in contrast to the volume tables used by BLM for thinning sales, which are based on form class, d.b.h., 5-inch top d.i.b. and total height. Thus, in order to use Table 3, the timber cruiser must have some data on tree heights in terms of 16-foot logs. There are two optional methods of application:

a. Determine, from the cruise data, the average form class, average total heights and corresponding average volume to a 5-inch top. In the form class volume table used for thinnings, look up the d.b.h. which most nearly corresponds to the average Scribner board foot volume. Then apply the formula:

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$$N = \frac{H - L_u\ (H - 16.3)}{16.3}$$ 1/

Where: N = Number of 16-foot logs in tree to 5-inch top

H = Total height of tree in feet from stump to tip

$$L_u = \frac{5/d_1\ (0.51)}{1 - 5/d_1 (0.49)}$$

in which:

d_1 = diameter inside bark at top of first 16-foot log (found by multiplying d.b.h.o.b. by form class)

After thus computing the number of 16-foot logs in the average tree, find the corresponding falling and bucking cost per tree in Table 3 and divide this cost in dollars by the average tree gross volume expressed in M bd. ft. Scribner log rule. Finally, adjust for defect and breakage.

Example:

Given an average form class of 80 and an average total height of 120 feet above stump. The 100 per cent cruise indicates a total gross volume of 1,260 M bd. ft. in 4,065 trees. Then,

Gross volume of average tree = 1,260,000 ÷ 4,065 = 310 bd. ft.

In the thinning volume table, form class 80, the volume of a tree of 120 feet total height most closely approaching that of the average tree is 303 bd. ft. The corresponding d.b.h. is 16 inches.

1/ From U.S. Forest Service Research Note PNW-2, Board-foot Tree Volume Equations for Electronic Computers, May 1963 - by Floyd A. Johnson of the Pacific Northwest Forest and Range Experiment Station.

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The formula is applied as follows:

$$N = 120 - \frac{L_u(120-16.3)}{16.3}$$

$$d_1 = 16 \times .80 = 12.8, \text{ and}$$

$$L_u = \frac{5/12.8 \times 0.51}{1-(5/12.8 \times 0.49)} = .25; \text{ substituting,}$$

$$N = \frac{120-.25(120-16.3)}{16.3} = 5.8 \text{ rounded to 6 logs}$$

per average tree.

Thus, the average tree is 16 inches d.b.h. and six 16-foot logs to a 5-inch top. The cost of falling and bucking this tree, from Table 3, is $3.45. On a per M basis, the cost is:

$3.45 ÷ .310 M (volume of average tree) = $11.13 per M bd. ft. gross volume.

This cost must be adjusted for net recovery. Assuming that, in this example, the cruise data show a total defect and breakage of fice per cent, the cost per M bd. ft. net volume is:

$11.13 ÷ .95 = $11.72 for falling and bucking merchantable trees.

b. The second method might be used advantageously for a sample cruise or a 100 per cent cruise of small volume. While this procedure is basically the more accurate, it may be more time consuming if manual processing must be done, as is now the case for commercial thinning cruise data have been computerized. Briefly, the second option involves calculating the total cost of falling and bucking all merchantable trees in the sample (or all merchantable trees in the total population in the case of a 100 per cent cruise). This total cost is divided by the total net merchantable volume to yield the falling and bucking cost per M for use in the appraisal.

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Example:

Given a 20 per cent sample cruise, with a net merchantable volume of 195 M bd. ft. in the sample. Heights in 16-foot logs of all 645 trees in the sample are tallied during cruising, and sample cruise data tabulated as follows:

D.B.H. Inches	No. of 16-foot Logs	No. of Trees	Fall. & Buck. Cost per Tree Table 3	Total Fall. Buck. Cost
8	1	5	2.30	11.50
	2	16	2.30	36.80
	3	9	2.90	26.10
	4	2	2.90	5.80
10	1	8	2.50	20.00
	2	17	2.50	42.50
	3	20	3.15	63.00
	4	5	3.15	15.75
	5	2	3.75	7.50
Etc.				
26	4	6	6.00	36.00
	5	11	6.60	72.60
	6	7	6.60	46.20
	7	2	7.20	14.40
30	5	2	8.55	17.10
	6	3	8.55	25.65
	8	1	9.15	9.15
	Totals	645 Trees		2285.29

The falling and bucking cost on a net volume basis is then:

$2285.29 ÷ 195 M bd. ft. net = $11.72/M for falling and bucking merchantable trees.

2. Merchantable Tree Falling and Bucking Costs. It will be noticed that the tabular cost for falling and bucking a one-log tree is the same as that for a two-log tree in the same d.b.h. class; the cost for falling and bucking a three-log tree is the same as that for a four-log tree, etc. The reason for this coincidence is that the costs are really based upon number of bucking cuts rather than on number of 16-foot logs, with a 32-foot log as standard. Thus, both one and two 16-foot logs represent one bucking cut; both three and four 16-foot logs represent two bucking cuts, etc.

3. Unmerchantable Tree and Snag Falling. Use Table 2.

D. Falling and Bucking - Selective Cuts. Table 4 is intended for costing the falling and bucking of trees marked as scattered individuals for sanitation-salvage or maturity selection cutting. These costs are not based on time studies but on the cost per thousand board feet log scale paid to fallers by industry. This conforms to the usual method of payment for falling and bucking in stands of ponderosa pine, sugar pine and associated species selectively marked by the Bureau of Land Management. Under this method of harvesting, marked trees are generally mature or overmature and of relatively uniform size.

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3. Rigging, Yarding and Loading.

4. Definitions.

a. Move In Cost. This is the cost of moving logging equipment into the timber sale contract area. In this schedule, it is considered separately from rigging cost.

b. Rigging Cost. Rigging cost is the cost involved in setting up yarding equipment in operating condition, the construction of landings, and the rigging of poles.

c. Yarding Distance. Yarding distance is the distance from choker setting point to landing over which the logs must actually travel. These distances refer to the distance for any turn or average of turns and not to the external distance for an area.

d. Yarding Cost. Yarding cost is the cost of moving logs from the bucked tree on the ground to the landing for loading or swinging. All yarding costs are based on the gross volume of material yarded to a landing. This volume will obviously include some defect in most cases. While the tables list cost by the volume of a 16' log, the studies included the normal range of log lengths actually yarded and were converted for use with cruise data.

e. Loading Cost. This is the cost of loading logs on a truck at a landing under normal conditions. Tabular costs are based on use of a medium loader with grapple or front end loader with log fork as customary with the type of yarding operation under consideration. The volume loaded is assumed to be essentially the same as that yarded, i.e., containing the same volume of defect. If this is not the case, an adjustment must be made to reflect the difference in recovery.

f. Yarding Distance Determination. To find the yarding distance for each area, the yarding distance factors found in the following tables are multiplied by the length of the side which is the denominator in the ratio. These factors apply to actual distances and areas. When used with a map layout, the result must be adjusted for slope.

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1. Tractor Logging. In order to allow for weave and slope in tractor yarding, a factor must be applied to the average horizontal yarding distance as found on the map layout. In the absence of data pertinent to a particular situation, it is suggested that this distance be increased by 20 per cent.

2. High-lead Logging. The slope factor in high-lead logging must be considered to determine actual distance. This can be done directly by drawing the setting layout to scale using actual slope distances to determine ratios and, thus, the yarding distance. However, sufficient accuracy can be obtained by calculating the average slope (tail block to base of lead pole) and applying a slope factor to the average horizontal yarding distance as determined through use of a map layout. Slope factors are found in Table 5.

3. Skyline Logging. As in yarding distance determination for high-lead logging, slope must be considered. However, ground slope and skyline slope are not synonymous. The latter is the slope of a chord from top of tower or spar tree at the landing to tail-hold anchor or top of tail spar, either of which may be located well outside the cutting area.

BLM time study data are based upon yarding distances measured along the average slope of skyline profile (ground slope) rather than skyline slope. Therefore, for skyline yarding, average ground slope should be measured or calculated from proposed spar location at landing to outer boundary of cutting area. With this exception, skyline yarding distance can be determined by the same procedures as high-lead yarding distance. See Table 5 for slope factors.

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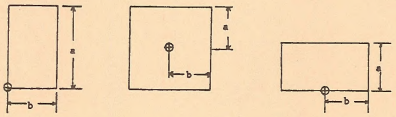
YARDING DISTANCE FACTOR BY RATIO OF SIDES



LOGGING DIAGRAMS

Ratio "a" / "b"	"b" Factor	Ratio "a" / "b"	"b" Factor	Ratio "a" / "b"	"b" Factor
.1	.50	2.9	1.57	5.7	2.91
.2	.51	3.0	1.61	5.8	2.96
.3	.53	3.1	1.66	5.9	3.01
.4	.55	3.2	1.71	6.0	3.06
.5	.58	3.3	1.76	6.1	3.11
.6	.61	3.4	1.80	6.2	3.16
.7	.64	3.5	1.85	6.3	3.21
.8	.67	3.6	1.90	6.4	3.26
.9	.71	3.7	1.95	6.5	3.31
1.0	.75	3.8	1.99	6.6	3.36
1.1	.78	3.9	2.04	6.7	3.40
1.2	.82	4.0	2.09	6.8	3.45
1.3	.86	4.1	2.14	6.9	3.50
1.4	.90	4.2	2.19	7.0	3.55
1.5	.94	4.3	2.23	7.1	3.60
1.6	.99	4.4	2.28	7.2	3.65
1.7	1.03	4.5	2.33	7.3	3.70
1.8	1.07	4.6	2.38	7.4	3.75
1.9	1.11	4.7	2.43	7.5	3.80
2.0	1.16	4.8	2.48	7.6	3.85
2.1	1.20	4.9	2.52	7.7	3.90
2.2	1.25	5.0	2.57	7.8	3.95
2.3	1.29	5.1	2.62	7.9	4.00
2.4	1.34	5.2	2.67	8.0	4.05
2.5	1.38	5.3	2.72	8.5	4.29
2.6	1.43	5.4	2.77	9.0	4.54
2.7	1.48	5.5	2.82	9.5	4.79
2.8	1.52	5.6	2.87	10.0	5.04

Divide "a" distance by "b" distance to determine ratio $\frac{a}{b}$. Multiply "b" distance by "b" factor to determine yarding distance. You may select either of the two distances for "a" distance. However, it is recommended that "b" distance be the shorter of the two.

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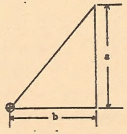
YARDING DISTANCE FACTOR BY RATIO OF SIDES



LOGGING DIAGRAMS

Ratio "a" / "b"	"b" Factor	Ratio "a" / "b"	"b" Factor	Ratio "a" / "b"	"b" Factor
.1	.67	2.9	1.17	5.7	2.01
.2	.67	3.0	1.20	5.8	2.05
.3	.67	3.1	1.23	5.9	2.08
.4	.68	3.2	1.26	6.0	2.11
.5	.69	3.3	1.29	6.1	2.14
.6	.70	3.4	1.31	6.2	2.17
.7	.71	3.5	1.34	6.3	2.20
.8	.72	3.6	1.37	6.4	2.24
.9	.73	3.7	1.40	6.5	2.27
1.0	.75	3.8	1.43	6.6	2.30
1.1	.76	3.9	1.46	6.7	2.33
1.2	.78	4.0	1.49	6.8	2.36
1.3	.80	4.1	1.52	6.9	2.39
1.4	.81	4.2	1.55	7.0	2.43
1.5	.83	4.3	1.58	7.1	2.46
1.6	.85	4.4	1.61	7.2	2.49
1.7	.87	4.5	1.64	7.3	2.52
1.8	.90	4.6	1.67	7.4	2.56
1.9	.92	4.7	1.70	7.5	2.59
2.0	.94	4.8	1.73	7.6	2.62
2.1	.97	4.9	1.76	7.7	2.65
2.2	.99	5.0	1.80	7.8	2.68
2.3	1.02	5.1	1.83	7.9	2.72
2.4	1.04	5.2	1.86	8.0	2.75
2.5	1.07	5.3	1.89	8.5	2.91
2.6	1.09	5.4	1.92	9.0	3.07
2.7	1.12	5.5	1.95	9.5	3.24
2.8	1.15	5.6	1.98	10.0	3.40

Divide "a" distance by "b" distance to determine ratio $\frac{a}{b}$. Multiply "b" distance by "b" factor to determine yarding distance. You may select either of the two distances for "a" distance. However, it is recommended that "b" distance be the shorter of the two.

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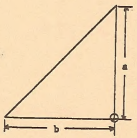
YARDING DISTANCE FACTOR BY RATIO OF SIDES



LOGGING DIAGRAMS

Ratio "a" / "b"	"b" Factor	Ratio "a" / "b"	"b" Factor	Ratio "a" / "b"	"b" Factor
.1	.33	2.9	1.02	5.7	1.93
.2	.34	3.0	1.05	5.8	1.96
.3	.35	3.1	1.09	5.9	1.99
.4	.36	3.2	1.12	6.0	2.03
.5	.37	3.3	1.15	6.1	2.06
.6	.39	3.4	1.18	6.2	2.09
.7	.41	3.5	1.21	6.3	2.13
.8	.43	3.6	1.25	6.4	2.16
.9	.45	3.7	1.28	6.5	2.19
1.0	.47	3.8	1.31	6.6	2.22
1.1	.50	3.9	1.34	6.7	2.26
1.2	.52	4.0	1.37	6.8	2.29
1.3	.55	4.1	1.41	6.9	2.32
1.4	.57	4.2	1.44	7.0	2.36
1.5	.60	4.3	1.47	7.1	2.39
1.6	.63	4.4	1.50	7.2	2.42
1.7	.66	4.5	1.54	7.3	2.46
1.8	.69	4.6	1.57	7.4	2.49
1.9	.72	4.7	1.60	7.5	2.52
2.0	.74	4.8	1.63	7.6	2.55
2.1	.77	4.9	1.67	7.7	2.59
2.2	.81	5.0	1.70	7.8	2.62
2.3	.84	5.1	1.73	7.9	2.65
2.4	.87	5.2	1.76	8.0	2.69
2.5	.90	5.3	1.80	8.5	2.85
2.6	.93	5.4	1.83	9.0	3.02
2.7	.96	5.5	1.86	9.5	3.18
2.8	.99	5.6	1.90	10.0	3.35

Divide "a" distance by "b" distance to determine ratio $\frac{a}{b}$. Multiply "b" distance by "b" factor to determine yarding distance. You may select either of the two distances for "a" distance. However, it is recommended that "b" distance be the shorter of the two.

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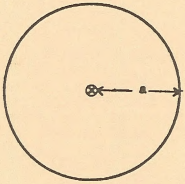
YARDING DISTANCE FACTOR FOR A CIRCLE OR CIRCLE SECTOR



Yarding Distance = .67

Where landings are in the center of a circle or the apex of a circle sector , the radius of the circle or the distance from apex to perimeter of the sector is multiplied by a factor of .67 to determine the average yarding distance.

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HIGH-LEAD LOGGING - SLOPE DISTANCE FACTORS 1/

Per Cent of Slope	Factor
5	1.00
10	1.00
15	1.01
20	1.02
25	1.03
30	1.04
35	1.06
40	1.08
45	1.10
50	1.12
55	1.14
60	1.17
65	1.19
70	1.22
75	1.25
80	1.28
85	1.31
90	1.35
95	1.38
100	1.41

1/ Ratio of slope distance to horizontal distance.

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C. Yarding of Cull Material (Gross Yarding). It is sometimes necessary to require that the timber purchaser remove cull material from a stream channel to allow passage of anadromous fish or to improve drainage. "Gross" yarding may also be desirable as preparation of the cutting area for establishment of the next crop of trees.

Appraisal allowances for such contractual requirements may be computed by treating the cull material to be yarded as additional gross merchantable volume with no net recovery.

A reasonably accurate estimate of the gross cull volume is essential. The total cost of yarding this volume by the means anticipated (tractor, high-lead, etc.) should be estimated in the same manner as for gross merchantable volume. This cost figure is carried into the yarding cost summary and becomes part of the total move in, rigging, yarding and loading cost. Thus the additional expense of "gross" yarding is reflected in the unit cost per MBF net volume.

D. Tractor Rigging, Yarding and Loading. (See cutting practice definitions under 9353.32B, Falling and Bucking.)

1. Move in Costs for Logging Equipment. Costs are based upon an average moving distance of 30 miles (one way). Move in costs are considered as separate items, apart from rigging costs. The appraiser may select from Table 1 a move in cost for any machine or combination of machines which he judges optimum for a particular situation. Thus he may tailor his cost allowance to the local situation. The listed allowances cover all the costs of moving equipment to the job including the wages of attendant personnel. The following example is given as a guide to the use of these tables:

Move in costs - usual high-lead side

Item	Cost
Medium Yarder	$465
Mobile Loader	435
D8K or equivalent	No allowance 1/
Total high-lead move in cost	$900

1/ D8K is considered an excavation tractor, to be used in road construction. Its move in cost is part of basic road construction move in allowance. If logging will involve no road construction, add $840.00 for D8K move in cost.

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2. Rigging Costs. As considered herein, these do not include the costs of moving equipment to the job, but are limited to costs involved in setting up yarding and loading equipment, the rigging of poles or spars, and landing construction. There are many situations which warrant other than normal rigging costs. Determination of the correct allowance is left to the discretion of the appraiser, but deviations from the standard allowances herein should be supported by explanatory statement.

3. Tractor Yarding - Clear Cut Operations. The tractor yarding costs that appear in Table 2 are the result of time studies taken on six Bureau of Land Management timber sales. Times were taken on the yarding, choker setting, delays and other related activities for some 511 turns on a wide range of conditions. (See Appendix 1, page 103.) Other data taken in the field were per cent slope, haul-in distance, straight-line distance, volume per log, volume per turn, number of logs per turn, and number of stems per acre. All of the foregoing items were analyzed to determine the significance of their effect on the time per MBF to tractor log. The machine rate used is current for a tractor having equivalent h.p. to those used on time study areas. It is extremely important to note that the distance referred to in this table is the distance the tractor actually moved in yarding the logs. As stated under 9353.32C2a, a factor must be applied to the average horizontal yarding distance as scaled from the map layout, to compensate for weave and slope. In the absence of data pertinent to a particular situation, it is suggested that this map distance be increased by 20 per cent (factor 1.2). It is not necessary to interpolate Table 2.

4. Tractor Loading - Clear Cut Operations. Loading for a clear cut tractor logging operation is hotdeck loading on a landing to which logs are yarded by tractor. Loading production varies directly with the production of the yarding operation, until volume yarded exceeds loading capacity and cold decking becomes necessary. From that point on, the cost remains uniformly equal to that of cold deck loading.

Two loading cost tables (for mobile loader with grapple and front end log loader) are included to assist the appraiser in estimating cost for the type of loading operation which he anticipates. It is not necessary to interpolate Tables 2 or 3.

5. Partial Cut Operations. The yarding and loading tables for partial cut tractor operations were developed from 28 time studies made on 16 operations. Yarding time and other pertinent data were recorded for 799 turns of logs over a wide variety of conditions in topography and marking practices. Cost tables are included for two loading alternatives. Do not apply a factor for weave to average yarding distance in using Table 5.

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6. Tractor Yarding, Selective Cutting Operations. These costs are based on time studies conducted under typical selective logging conditions; i.e., slopes varying but not generally severe, and rather normal, fairly open stands. The machine rate used is current for a tractor having equivalent h.p. with those used on time study areas. The distances are, as in the case of clear cut tractor yarding, those which the tractor actually travels. Under the normal Bureau of Land Management average yarding distance determination procedures, an addition must be made to compensate for additional tractor traveling distance in order to use this table. An increase of 20 per cent is suggested to compensate for weave and slope.

7. Tractor Loading, Selective Cutting Operations. Loading for a selective cut tractor logging operation is hot deck loading on a landing to which logs are being yarded by tractor. The production again varies directly with the production of the yarding operation to the limit of loading capacity. The front end log loader's production varies directly with the availability of logging trucks and the production of the yarding operation to the limit of loading capacity. From that point on, the cost remains uniformly equal to that of cold deck loading. Cost tables are included for two loading alternatives.

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E. High-lead Rigging, Yarding and Loading.

1. High-lead Yarding. The following tables are based on two sets of time studies on twelve Bureau of Land Management timber sales. The first set involved times for some 1183 turns. The second set included times for 801 turns. Care was taken to insure that a wide variety of logging conditions was included. (See Appendix 1, Page 121.) Other data recorded in the field were ground slope, line slope, yarding distance, number of logs per turn, gross volume per turn, volume per acre, and stems per acre. Each set of studies was then analyzed separately but in an identical manner. The time per MBF for each turn was determined. Then the field data, such as yarding distance, volume per log, stems per acre, etc., were tested to determine the significance of their effect upon the time per MBF. In both sets of studies, the same factors were statistically significant - volume per log, per cent line slope, and yarding distance. Through a covariance analysis it was determined that the two sets of studies could not be combined and considered as one. As a result, a common equation was computed. The yarding time per MBF table (see Appendix 1, Page 121) was then constructed from the common equation. Supplemental delay times were added and the machine and wage rates applied. The tables are constructed so that no interpolation is necessary.

2. Portable Tower Yarding. The tables were developed by applying portable tower machine rates plus applicable crew wage rates to the regular high-lead times per MBF (see Appendix 1, pages 121, 123.

3. High-lead Loading. High-lead loading is hot deck loading on a high-lead landing. The production varies directly with that of the yarder to the point at which volume yarded exceeds loading capacity and cold decking becomes necessary. From this point the cost is uniformly equal to that of cold deck loading. It is not necessary to interpolate Table 24.

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F. Skyline Rigging, Yarding and Loading. Modern skyline systems may offer substantial advantages over conventional logging systems by reducing excessive road construction costs, providing better watershed protection and minimizing soil losses and diversion of productive forest land to roads.

Skyline logging may require different access road locations than logging with conventional equipment. Therefore, planning for skyline layouts should be coordinated with transportation planning.

1. Static Skyline Yarding (Fixed Skyline). This section pertains to operation of large skyline equipment with uphill or downhill yarding capability of 5,000 feet or more, slope distance.

The cost tables are based on a time study conducted on Bureau of Land Management clear cut timber sale layouts over a period of four months. Data recorded in the field included skyline slope yarding (in-haul) distance (measured along average ground slope), lateral skidding distance and lateral slope (both measured at right angles to skyline axis), number of logs per turn, gross volume per turn, and time for each phase of the yarding cycle (haulback, lateral outhaul, hooking, lateral skidding, in-haul and unhooking). These data were grouped in two categories, uphill yarding (248 turns) and downhill yarding (210 turns).

Initial analysis indicated that total time per MBF yarded, rather than time for each phase of the cycle, was meaningful. Each type of yarding was then analyzed separately but in an identical manner. The field data were tested to determine the effect of each independent variable on time per MBF. In both uphill and downhill yarding, the most statistically significant variable, by far, was volume per log, as calculated from number of logs per turn and gross volume per turn. Yarding distance was significant at a much lower level.

A covariance analysis showed that the data for the two types of yarding could not be combined to serve as a single datum base. Therefore, a common equation was developed to fit both types of data. This equation includes a delay time factor. The table of yarding time per MBF was then constructed from this equation. Machine and wage rates were applied to the yarding times. The resulting cost tables need no interpolation.

2. Running Skyline Yarding. (Reserved)

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3. Skyline Loading. Skyline loading is hot deck loading on a skyline landing. As in high-lead loading, production varies directly with that of the yarder. No separate skyline loading cost table is included herein because it would have very limited usefulness. If skyline hot deck loading costs must be separately identified, they can be calculated by deducting yarding costs from the corresponding combined yarding and loading costs. If cold deck loading cost is needed, see 9353.32C8.

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G. Swinging. This is the operation which moves logs from a deck to a roadside landing.

1. Hot Deck Swinging.

a. Definition. Hot deck swinging is conducted simultaneously with yarding; i.e., the logs yarded to the "hot deck" are "swung" to the roadside landing as fast as they are yarded. The swinging production rate is thus limited by the capacity of the yarder.

b. Costs. Since the producing capacity of the yarder is the limiting factor, high-lead hot deck swinging costs are based upon yarder production as indicated by BLM time studies. Cost of operating a swing tree has been applied to the time dictated by the conditions which determine yarding production.

2. Cold Deck Swinging.

a. Definition. Cold deck swinging takes place after all the logs have been yarded and decked. It involves the movement of logs from "cold storage" to a roadside landing. Factors which limit cold deck swinging production include yarder line speed, log size, and distance from deck to landing.

b. Costs. These are based on time studies made on operations using the North Bend skyline system. Adjustments have been made for current costs. Since yarding production has no influence, yarding distance is excluded as a cost factor. Log size and distance from deck to roadside landing are the variables used to determine cost.

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(Schedule 4)

H. Cold Deck Loading. This refers to the loading of trucks from a landing on which the loading production is not limited to the production of the yarding operation, as it is under hot deck loading conditions.

1. Costs. Costs are based on the operation of 3 machines: mobile loader, front end log loader and mobile yarder-loader, loading 125 M bd. ft. per eight hours.

Mobile Loader -	2.16/MBF
Front End Log Loader -	1.93/MBF
Mobile Yarder-Loader -	4.39/MBF

Basic data, Appendix 1, pages 155, 157 and 159

I. Small Operations.

1. Purpose. This section is intended for use where sales of small volumes of timber are contemplated. Examples might be sales of right-of-way timber or the salvage of a few high-risk trees or merchantable snags.

2. Equipment. Data are given for two types of small operations, to be used as the appraiser sees fit.

a. Mobile Loader with Yarding Tractor. Here the production of the loader is limited by the capacity of the yarding operation; tractor loading tables should be used.

b. Mobile Yarder-Loader (Skagit SJ5R)
This machine is particularly adapted to situations where neither highlead nor tractor logging is profitable; for example, light stands per acre and/or small timber on steep terrain. Since the machine is used for both yarding and loading, the loading operation should involve little or no delay time. Therefore, loading cost per M bd. ft. is relatively constant.

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J. Commercial Thinnings.

1. Definitions. Yarding distance, yarding cost, move in cost and rigging cost, as considered here, are adequately defined in 9353.32C1. Loading cost, as defined for commercial thinnings, is the cost of loading logs on a truck from a cold deck at a landing. The cost is based on the operation as performed by a logging contractor using a light rubber-tired shovel-type loader equipped with grapple. If it is anticipated that loading will be done by front end loader equipped with log fork, use Table 46 rather than Table 47. This loading operation includes whatever percentage of defect will be hauled to the plant, which is presumed to be approximately the same as that yarded.

2. Move In Costs for Logging Equipment. Move in costs are considered as separate items, apart from rigging cost. Table 41 lists move in costs for two tractors (light crawler and rubber-tired skidder), a mobile yarder-loader and a front end log loader. If the appraiser anticipates that the logging job will require additional equipment, he should include appropriate move in cost allowances from Table 1.

3. Rigging Costs. The information in 9353.33D2 applies here. Use Table 42 for rigging costs.

4. Yarding Distance Determination. The instructions in 9353.33B apply here. Average horizontal yarding distance, as found on the map layout, must be increased by an appropriate factor to allow for weave and slope. In the absence of more refined data, a twenty per cent increase is suggested.

5. Yarding Cost Basis. Tables 45 and 46 are based upon field studies conducted by the Pacific Northwest Forest and Range Experiment Station on commercial thinning operations in western Oregon and western Washington. Production times developed from these studies were combined with average California hourly operation costs. Study areas were characterized by moderately even-age stand conditions and slopes generally under 40 per cent. Time study data included observations of 236 turns of logs for the light crawler tractor and 296 turns for the rubber-tired skidder. Data were recorded for a wide range of variables, all of which were analyzed for significance by step-wise multiple regression. Significant variables were retained in the formulae developed to compute yarding cycle time for each of the two tractors. It is not necessary to interpolate Tables 45 and 46.

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6. Yarding Equipment. The appraiser is given a choice of two machines because silvicultural objectives and/or physical factors may favor the use of one or the other. When the average log is small, as it normally is in a thinning sale, the rubber-tired skidder is substantially more economical, on a cost per M basis, than is the light crawler tractor. However, difficult terrain and a considerable number of large logs may require the greater tractive power of the crawler. Preference of local loggers for one machine or the other may also influence the appraiser's choice.

7. Loading Costs. See Table 45, 46 and 47.

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.34 Transportation. These costs include all expenses incurred in moving logs from woods landing to utilization center. Generally, these are trucking expenses; however, water transportation costs may be involved.

A. Standard Method. This involves timing of actual round trip truck hauling operations on specific road segments. Since this method is based upon empirical measurements of time, all physical effects of road geometrics (grade, alignment, width) and surface will be reflected in the recorded time.

All costs involved in moving merchantable material from loading point to utilization center will be evaluated. These costs will incorporate ownership and operating expenses for the average logging truck and round trip time and normal delay time for the truck.

1. Cost Factors.

a. Operating Time. Those periods when the truck is actually transporting logs to the destination or returning empty to the loading point. Operating time includes legally required stops at intersections and unavoidable delays in traffic, and other variable, unpredictable delays such as tightening binder chains, minor repairs made by driver, smoke breaks, conversation, etc.

b. Normal Delay Time. Those periods when the truck is on the job, but not in operating status. It includes relatively constant, predictable periods in two general categories:

(1) Observed Delays. Those caused by loading, unloading scaling, weighing, etc. These delays are seen and recorded during collection of truck hauling data, and are part of total mean time per round trip.

(2) Fixed Delay. An allowance of 30 minutes per day is included to compensate for time spent in engine warmup and routine servicing and fueling of the truck. This allowance is based upon data collected from industry.

Normal delay time does not include any breakdown which requires shop repair, or the services of a skilled mechanic. The same is true of a spilled load of logs. Such an observation should be ended at the location where the breakdown or load loss occurs.

c. Round Trip Minute (RTM). The basic unit in measurement of round trip time from loading point to destination which includes observed delay time as defined in b(1) above.

d. Destination. Point to which truck load of logs is delivered. It may be a utilization center, or it may be a log dump on a waterway or a reloading point on a railroad, intermediate between woods and utilization center.

e. Gross Load Volume. This is the gross volume of the average truck load of logs as estimated for a given area. It will vary with locality and type of material hauled (run-of-the-woods logs, logs from commercial thinnings, "cull" logs). Each BLM district should review its truck scale records periodically. These records should be used as a basis for predicting the average gross load volume for a given proposed sale.

Current data indicate that the average gross load volume for BLM sales in Northern California is 7.190 M bd. ft. (short log scale).

f. Road Categories. Data will be kept in four broad classifications:

Log Haul Road Class	Definition	Usable Width
I	Highway	24 ft. and over
II	Two land road	20 - 23+ ft.
III	Single land road	12 - 19+ ft.
IV	Logging spur road	10 - 11+ ft.

2. Clocking Procedure. Road clocking can be accomplished by various means. A two-man crew can do the job, one man driving and reading the odometer while the other observes and serves as timekeeper and recorder.

Another method involves the use of a "cassette" type tape recorder with microphone equipped with on-off switch hung around the driver's neck for oral note taking. A stop watch is taped to the dashboard near the odometer for recordation of time and mileage. This technique reduces road clocking to a one-man operation, the driver functioning simultaneously as observer and recorder. Notes are later transcribed from tape to road clocking forms. Field testing indicates that this procedure is practical and efficient.

Road clocking may also be done by crews equipped with two-way radios. Since clocking can thus be done without actually following the truck under observation, driving is kept to a minimum. One radio-equipped crew member is stationed at the loading point, the others at critical

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check points (road junctions) along the route. The truck being timed is identified from station to station by physical description, make and license number.

3. Number of Observations Required. This will depend upon the variation of the individual observations. A minimum of five sample runs, from loading point to destination (loaded) and from destination to loading point (empty) is required. If the total elapsed operating time of one of these observations should vary by more than thirty percent from the mean total operating time of all observations, it will be necessary to make five additional observations. In this case, all ten observations should be used in recomputing mean total operating time.

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4. Hauling Cost Computations. These follow the same general format as described in 9353.34B3 (Alternative Method), except that clocked round trip time includes observed delay time rather than a constant 40-minute allowance per round trip, and hauling cost per MBF net volume is derived from the total gross volume hauled per day. The 9333.34B3 guidelines on full round trips and fractional trips apply here.

Using the same basic assumptions as in the example under 9353.34B3:

Maximum day (12 hours) -	720 min.
Minus 30 minutes fixed delay time (for engine warmup, truck servicing and fueling) -	-30 min.
Net available operating time -	690 min.
Total mean time/round trip (includes observed delays) -	210 RTM
Maximum number of trips per day: 690 min. ÷ 210 total mean RTM = 3.29 trips	
Complete round trips 3.0 @ 210 RTM each -	630 min.
Minus 7 1/2 hours straight time -	-450 min.
Operating overtime -	180 min.

Costing time:	
450 minutes	
+ 30 minutes fixed delay time	
480 minutes x $0.515/min. straight time 1/ -	$247.20
180 minutes overtime x $0.568/minute 1/	102.24
Total hauling cost, 3 loads	$349.44/day

No. loads/day 3.0 x 5.000 M bd. ft./gross load = 15.000 M, total gross volume hauled per day
Total hauling cost/day $349.44 ÷ 15.000 M. gross volume = $23.94/M gross volume hauled

$$\frac{\text{(M total net volume) 2/}}{\text{(M tot. gr. merch. vol.) 2/ 3/}} = \frac{3{,}213}{3{,}570} = 0.90 \text{ log scale recovery (decimal fraction)}$$

Truck haul unit cost = $23.30/M gross volume ÷ 0.90 log scale recovery = $25.89/M net merch. volume

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B. Alternative Method. This employs time data collected by past procedures, i.e., using distance, percent of rise and rate of rise and fall as independent variables. However, the laternative method derives costs from time data by essentially the same mechanics as used in the preferred standard method.

The time tables following this section are based on hauling under virtually all conditions. The times have been related only to the variables distance, percent of rise and rate of rise and fall. In the selection of areas in which to make studies, the factor of road alignment, as it limits rate of travel, was considered. Therefore, while it is not possible to isolate as an individual variable, some reduction in speed due to road alignment has been introduced through the sample.

1. Definitions.

a. Per Cent of Rise. Per cent of rise is that portion of undulating road over which the truck has to move its load uphill; it is found by dividing the total rise by the total rise and fall. If the total change in elevation for a given road is 1,200 feet of which 300 feet is uphill travel, the "percent of rise" would be 25%. Since Tables 1, 2 and 3 are graduated in increments of ten per cent, 25% would fall in the 20% to 30% class.

b. Rate of Rise and Fall. Rate of rise and fall is the total change in elevation of any road compared to its total length. If a road 10 miles (52,800 feet) in length had a total rise and fall of 5,000 feet, the rate of rise and fall would be -

$$\frac{5{,}000 \text{ feet}}{52{,}800 \text{ feet}} \text{ or}$$

9.46%, rounded to 9.5%.

c. Surface

(1) Hardtop.

(a) Concrete, any lane width
(b) Black top, any lane width
(c) Gravel, when two-lane width, road surface 1-inch minus material, well graded and compacted; good visibility
(d) Dirt, when two-lane width, road surface well graded and compacted; good visibility

(2) Gravel. All gravel roads other than (c) above.

(3) Dirt. All dirt roads other than (d) above.

d. Log Scale Recovery. Log scale recovery in this section is the appraiser's estimate of the percent of the material hauled from the woods which will be recovered in products.

e. Operating Time. Those periods when the truck is available for transporting logs. Operating time (under the alternative method) includes a constant allowance of 40 minutes per round trip which is added to the total clocked time to cover loading and unloading, scaling, weighing, unavoidable delays in teaffic, legally required stops at intersections, and other variable, unpredictable delays such as tightening binder chains, minor repairs made by driver, smoke breaks, conversation, etc.

f. Fixed Delay Time. An allowance of 30 minutes per day is included to compensate for time spent in engine warmup and routine servicing and fueling of the truck. This allowance is based upon data collected from industry.

g. Truck (On Highway). Diesel or gasoline truck and trailer combination with maximum 8-foot bunks and legal restriction on gross weight. See footnote 2, Table 5.

h. Truck (Off Highway). Diesel or gasoline truck and trailer combination not restricted to "on highway" bunk width and gross weight limitations. See footnote 2, Table 5.

2. Road Measurements. To use the following tables, measurements of rise, fall and mileage must be made on the road to be used.

a. Rise and Fall. The easiest method of measuring the rise and fall in a road is with a sensitive type altimeter (Wallace and Tiernan or equivalent) which can be read to the nearest two feet. When using a base instrument, two runs should be made over the road at any time of the day. When the base is not used, the two runs must be made between six and ten in the morning or from three to six in the afternoon. This is due to barometric and temperature change. It cannot be too greatly stressed that all rises and all falls must be measured. The instrument must be level and allowed to come to rest before moving to the next reading. When allowing for transportation on roads not yet constructed, the appraiser shall estimate the changes in elevation to the best of his ability.

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b. Mileage. Mileage can be read from the odometer to the nearest tenth of a mile. All important road junctions should be noted and the mileage thereto recorded.

3. Hauling Cost Computations. Machine costs, wages and manpower costs, and general and administrative costs for truck haul are combined and reduced to per minute bases for straight time (8-hour day) and overtime.

For each timer appraisal, the appraiser must calculate the maximum number of round trips (including all delay times) that could be made during a 12-hour day.1/ If full round trips are customary in the operating area under consideration, the maximum number of complete round trips should be used in computing hauling cost. In some areas it is not unusual to leave the truck at a location other than the unloading point at the end of the driver's working day; also, trucks may be rotated so that the number of full round trips the individual driver makes will vary from day to day. In either of the latter situations, the appraiser may consider fractional trips in his calculations.

Cost computations are illustrated by the following example.

Given an estimated log weight of 10.0 pounds per bd. ft., cruise data indicating a 90 per cent log scale recovery, a new volume of 4.500 MBF per load (from Table 5) and a clocked round trip time of 170 minutes obtained from altimeter and odometer readings:

Clocked round trip time -	170 min.
Allowance for "operating" delays (9353.34B1e) -	40 min.
Total time per round trip -	210 min.
Maximum day (12 hours) 1/ -	720 min.
Minus 30 minutes fixed delay time (9353.34B1f) -	30 min.
Net available operating time -	690 min.

Maximum number of trips per day:
690 minutes ÷ 210 minutes/round trip = 3.29 trips

Complete round trips - 3.0 @ 210 min. ea. =	630 min.
Minus 7 1/2 hours straight time (1/2 hour straight time spent in fixed delay) =	- 450 min.
Operating overtime =	180 min.

9353.34 - TRANSPORTATION COSTS

(Schedule 4)

Costing straight time:
450 minutes
+ 30 minutes fixed delay
480 minutes x $0.535/minute 2/ = $256.80

Costing overtime:
180 minutes x $0.568/minute 2/ = 102.24
Total hauling cost, 3 loads: $359.04/day

Total net volume hauled:
3 loads x 4.5000 MBF net/load = 13.500 MBF/day

Truck haul unit cost:
$359.04 ÷ 13.500 MBF = $26.60/MBF net volume

1/ Basic data, Appendix 1, Pages 191 and 192

2/ From Table 6

9353.34 - TRANSPORTATION COSTS
(Schedule 4)

ROUND TRIP TIME - HARD SURFACE

Minutes per Mile

Rate of Rise & Fall	Per cent of Rise 1/									
	0-10 Min.	10-20 Min.	20-30 Min.	30-40 Min.	40-50 Min.	50-60 Min.	60-70 Min.	70-80 Min.	80-90 Min.	90-100 Min.
0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
0.5	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.2
1.0	3.1	3.1	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.4
1.5	3.2	3.2	3.3	3.3	3.4	3.5	3.5	3.6	3.6	3.7
2.0	3.3	3.4	3.5	3.5	3.6	3.7	3.8	3.9	4.0	4.1
2.5	3.4	3.5	3.7	3.8	3.9	4.0	4.2	4.3	4.4	4.6
3.0	3.6	3.7	3.9	4.1	4.3	4.5	4.6	4.8	4.9	5.1
3.5	3.8	4.0	4.2	4.4	4.6	4.9	5.1	5.3	5.5	5.8
4.0	4.0	4.2	4.5	4.8	5.1	5.4	5.7	5.9	6.2	6.5
4.5	4.2	4.5	4.9	5.2	5.5	5.9	6.2	6.6	6.9	7.3
5.0	4.4	4.8	5.3	5.7	6.1	6.6	7.0	7.4	7.8	8.3
5.5	4.7	5.2	5.7	6.2	6.8	7.2	7.7	8.2	8.8	9.3
6.0	5.0	5.5	6.1	6.7	7.3	8.0	8.5	9.1	9.8	10.3
6.5	5.3	5.9	6.6	7.3	8.0	8.8	9.5	10.1	10.8	11.6
7.0	5.6	6.4	7.2	8.0	8.8	9.4	10.4	11.2	12.0	12.8
7.5	5.9	6.8	7.7	8.7	9.6	10.5	11.4	12.3	13.2	14.1
8.0	6.3	7.3	8.4	9.4	10.4	11.5	12.5	13.5	14.6	15.6
8.5	6.7	7.8	9.0	10.1	11.3	12.5	13.6	14.7	15.9	16.1
9.0	7.1	8.4	9.7	11.0	12.3	13.6	14.9	16.2	17.5	18.8
9.5	7.6	9.0	10.4	11.9	13.3	14.7	16.1	17.6	19.0	20.5
10.0	8.0	9.6	11.2	12.8	14.3	15.9	17.5	19.1	20.7	22.2

1/ Per cent of rise figured in direction of loaded truck. Round-trip time is that time required for a loaded truck to travel one mile and return.

9353.34 - TRANSPORTATION COSTS

(Schedule 4)

ROUND TRIP TIME - GRAVEL SURFACE

Minutes per Mile

Rate of Rise & Fall	Per cent of Rise 1/									
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.
0.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
0.5	5.0	5.0	5.0	5.1	5.1	5.1	5.2	5.2	5.2	5.2
1.0	5.0	5.0	5.1	5.2	5.2	5.3	5.3	5.4	5.4	5.5
1.5	5.1	5.2	5.3	5.4	5.5	5.5	5.6	5.7	5.8	5.9
2.0	5.3	5.4	5.5	5.6	5.7	5.9	6.0	6.1	6.2	6.3
2.5	5.5	5.7	5.8	6.0	6.2	6.3	6.5	6.7	6.9	7.0
3.0	5.8	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.5	7.7
3.5	6.1	6.4	6.7	6.9	7.2	7.5	7.7	8.0	8.3	8.5
4.0	6.5	6.8	7.1	7.5	7.8	8.1	8.5	8.8	9.1	9.4
4.5	7.0	7.4	7.8	8.2	8.6	9.0	9.4	9.8	10.2	10.6
5.0	7.5	8.0	8.4	8.9	9.4	9.8	10.3	10.7	11.2	11.7
5.5	8.1	8.7	9.2	9.8	10.3	10.8	11.4	11.9	12.4	13.0
6.0	8.8	9.4	10.0	10.6	11.2	11.8	12.4	13.0	13.7	14.2
6.5	9.5	10.1	10.8	11.5	12.2	12.9	13.5	14.2	14.9	15.5
7.0	10.1	10.8	11.6	12.3	13.1	13.9	14.6	15.3	16.1	16.8
7.5	10.8	11.6	12.4	13.2	14.1	14.9	15.7	16.8	17.3	18.1
8.0	11.4	12.3	13.2	14.1	15.0	15.9	16.7	17.7	18.8	19.5
8.5	12.1	13.0	14.0	15.0	15.9	16.9	17.9	18.8	19.8	20.8
9.0	12.7	13.7	14.8	15.8	16.8	17.9	18.9	20.0	21.0	22.0
9.5	13.4	14.5	15.6	16.7	17.8	18.9	20.0	21.1	22.3	23.4
10.0	14.0	15.2	16.4	17.5	18.7	19.9	21.1	22.3	23.5	24.7

1/ Per cent of rise figured in direction of loaded truck. Round-trip time is that time required for a loaded truck to travel one mile and return.

9353.34 - TRANSPORTATION COSTS
(Schedule 4)

ROUND TRIP TIME - DIRT SURFACE

Minutes per Mile

Rate of Rise & Fall	Per cent of Rise[1]									
	0-10 Min.	10-20 Min.	20-30 Min.	30-40 Min.	40-50 Min.	50-60 Min.	60-70 Min.	70-80 Min.	80-90 Min.	90-100 Min.
0.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
0.5	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
1.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
1.5	7.9	7.9	8.0	8.0	8.0	8.1	8.1	8.1	8.2	8.2
2.0	7.9	8.0	8.0	8.1	8.2	8.2	8.3	8.4	8.4	8.5
2.5	7.9	8.0	8.2	8.3	8.4	8.5	8.7	8.8	8.9	9.0
3.0	7.9	8.1	8.3	8.5	8.7	8.8	9.0	9.2	9.4	9.6
3.5	8.1	8.4	8.6	8.9	9.1	9.4	9.6	9.9	10.1	10.4
4.0	8.3	8.6	8.9	9.3	9.6	9.9	10.2	10.6	10.9	11.2
4.5	8.7	9.1	9.5	9.9	10.3	10.7	11.1	11.5	11.9	12.3
5.0	9.1	9.6	10.1	10.5	11.0	11.5	12.0	12.4	12.9	13.4
5.5	9.7	10.2	10.8	11.3	11.8	12.4	12.9	13.4	14.0	14.5
6.0	10.3	10.9	11.5	12.0	12.6	13.2	13.8	14.4	15.0	15.6
6.5	11.1	11.7	12.3	12.9	13.6	14.2	14.8	15.4	16.0	16.7
7.0	11.8	12.5	13.1	13.8	14.5	15.1	15.8	16.5	17.1	17.8
7.5	12.8	13.5	14.2	14.8	15.5	16.2	16.9	17.5	18.2	18.9
8.0	13.7	14.4	15.1	15.8	16.5	17.2	17.9	18.6	19.3	20.0
8.5	14.7	15.4	16.1	16.9	17.5	18.2	19.0	19.7	20.4	21.1
9.0	15.6	16.3	17.1	17.8	18.5	19.3	20.0	20.7	21.5	22.2
9.5	16.6	17.3	18.1	18.8	19.6	20.3	21.1	21.8	22.6	23.3
10.0	17.5	18.3	19.0	19.8	20.6	21.3	22.1	22.9	23.6	24.4
10.5	18.5									
11.0	19.4									
11.5	20.3									
12.0	21.3									
12.5	22.3									
13.0	23.3									
13.5	24.2									
14.0	25.0									
14.5	26.1									
15.0	27.0									

1/ Per cent of rise figured in direction of loaded truck. Round-trip time is that time required for a loaded truck to travel one mile and return.

9353.34 - TRANSPORTATION COSTS

(Schedule 4)

WEIGHT RANGES BY SPECIES
(Pounds per Board Foot)

Douglas-fir	5.5 - 13.5 lb. 1/	Port-Orford-cedar	6.0 - 10.3 lb.
Ponderosa pine	6.5 - 11.5 lb.	Hemlock	8.4 - 11.8 lb.
Sugar pine	7.0 - 11.5 lb.	White fir	8.6 - 10.0 lb.
Spruce	5.0 - 7.5 lb.	Larch	6.5 - 10.0 lb.

1/ Use 11.0 lbs. as standard for commercial thinnings. (Appendix 1, Page 269.) However, this log weight may be varied if well-documented experience indicates that other log weight averages are locally more applicable. Other log weight averages, if used, should be based upon accurate truck scale records and actual load weights from weighing stations. Load weights exceeding legal limits should not be used as basic data.

Variation from the standard 11.0 lbs. per board foot will affect both log hauling and loading costs. Fixed loading time for variable average weights will have to be computed and total loading time and cost adjusted accordingly. See footnote 3, Appendix 1, Page 269.

9353.34 - TRANSPORTATION COSTS

(Schedule 4)

NET VOLUME IN MBF PER LOAD 1/ 2/

Log Wt. per Bd. Ft.	Log Scale Recovery in Per Cent						
	100	95	90	85	80	75	70
7.0	7.142	6.785	6.428	6.071	5.714	5.356	4.999
7.5	6.666	6.333	5.999	5.666	5.333	4.999	4.666
8.0	6.250	5.937	5.625	5.312	5.000	4.687	4.375
8.5	5.882	5.588	5.294	5.000	4.705	4.411	4.117
9.0	5.555	5.277	4.999	4.722	4.444	4.166	3.888
9.5	5.263	5.000	4.737	4.474	4.210	3.947	3.684
10.0	5.000	4.750	3.500	4.250	4.000	3.750	3.500
10.5	4.762	4.524	4.286	4.048	3.810	3.571	3.333
11.0	4.545	4.318	4.090	3.863	3.636	3.409	3.181

1/ Estimated average gross weight - loaded log truck and trailer - 72,000 lbs.
Net weight of log truck and trailer - 22,000 lbs.
Load Weight - 50,000 lbs.

2/ This table is intended only as an Alternative Method guide for estimating cost of transportation by "on highway" trucks. Experience may indicate that these load volumes are commonly exceeded by local practice. For example, timber sale access may be by roads on which "off highway" loadings are permitted. The appraiser should use the average net load volume which best fits the given situation.

Chart 6
(9353.34A1)
(9353.34B3)

9353.3 - PRODUCTION COSTS

(Schedule 4)

TRANSPORTATION

LOG TRUCK HAULING RATES

(Truck - White Model 4964 w/Peerless Trailer)

Straight Time	$30.91/hour $ 0.515/minute
Overtime*	$34.08/hour $ 0.568/minute
Delay Cost	$19.00/hour $ 0.317/minute

*Overtime rate is straight time plus 50% increase in Driver's wage rate.

Basic Data, Appendix 1, Pages 189-192.

9353.34 - TRANSPORTATION COSTS

(Schedule 4)

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March 1974

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

District Sale No. ____________

APPRAISAL WORK SHEET

TRANSPORTATION COSTS

LOG HAULING TIME RECORD SHEET

BLM District ____________ Resource Area ____________

Road Number or Name ____________

Road Class: I [ ] II [ ] III [ ] IV [ ]

Truck Type on Highway [ ] off Highway [ ] Loading Point Location ____________

Load Status Empty [ ] 1/ Loaded [ ] 1/ Destination ____________

Observation No. ____ Date: ____________ By: ____________

Clocking Vehicle No. ____________ Odometer Correction Factor ____________

Truck No. or Name ____________

Remarks:

ROAD SEGMENT DATA - SEGMENT NO. ______

Location	Odometer Reading 2/	Elapsed Miles 2/ 3/	Watch Reading Hrs. Mins. 4/	Elapsed Time Mins. 4/	Check One: Oper. Time 5/	Check One: Delay Time 6/	Function (Loading, Unload, etc.) 7/
TOTALS							

1/ Use separate [illegible] for empty & loaded data.
2/ To nearest [illegible] mile.
3/ Correct for [illegible] meter overrun or [illegible].
4/ To nearest [illegible] minute.
5/ Operating time includes [illegible] required stops at [illegible] tions and [illegible] traffic del[illegible], stop [illegible] binder cha[illegible], minor repairs, [illegible] breaks etc.
6/ Delay time are those periods when the truck [illegible] the [illegible] but not in operating status (time spent at loading and unloading points and at scaling and weighing stations).
7/ Includes waiting time.

Illustration 2
(9353.34B3)

9353.34 - TRANSPORTATION COSTS

(Schedule 4)

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March 1974

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

District Sale No. _____

APPRAISAL WORK SHEET

TRANSPORTATION COSTS

ROUTE SUMMARY SHEET

On Highway ☐
Off Highway ☐

BLM District _____ Resource Area _____

Road No. or Name _____ Utilization Center _____

Segment No. and Description	Miles	Loaded		Empty		Total Mean Time R.T.M.	Cumulative Time R.T.M.
		No. Obsvs.	Mean Time	No. Obsvs.	Mean Time		
TOTALS							

9353.34 - TRANSPORATION COSTS

(Schedule 4)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

District Sale No. _____

APPRAISAL WORK SHEET

TRANSPORTATION COSTS

	#1 Peeler	#2 Peeler	#3 Peeler	Special Peeler	#2 Sawmill	#3 Sawmill	Total
Net Volume							
Peeled Ratio	x .45	x .45	x .75	x .75	x .30	x .10	
Peeled Volume							

Total Peeled Volume _____ + _____ Total Net Volume = _____% Peeled; _____% Sawed

Utilization Center	Miles	Minutes - Sale Area to Util. Center	Volume MBF	% Total Volume	Weighted Travel Time Minutes
Logs Peeled					
Logs Sawed					
		TOTALS			

Truck Haul

Maximum day (12 hours) - 720 Minutes

Less 30 minutes fixed delay - - 30 Minutes

Net available operating time - _____ Minutes

Total mean time/round trip (includes observed delay) - _____ MIN

Maximum number of trips per day:

690 Min. ÷ _____ total mean MIN/trip = _____ Trips

Complete round trips 2.0 @ _____ MIN each = _____ Minutes

Less 7½ hours straight time = - 450 Minutes

Operating overtime = _____ Minutes

480 Minutes x $0. /minute straight time = $.

_____ Minutes x $0. /minute overtime = .

Total hauling cost, _____ loads = $. per day
(No.)

No. loads/day .0 x M bd. ft./load = _____M, total gross merch. volume hauled

Total hauling cost/day $. ÷ _____ M gr. merch. volume $. /M Gross merch. vol.

M net merch. volume / M gross merch. volume = .0 Log scale recovery (decimal fraction)

Subtotal truck haul cost = $. /M gross merch. vol. = $. /M net merch. vol. ÷ .0 Log scale recovery

Later Transportation (Explain) - $. /M

Extraordinary Costs (Explain) - . /M

Subtotal, other transportation cost = $. /M

TOTAL TRANSPORTATION = $. /M

EXPLANATION: _____

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

.35 Contractual Costs - This group of costs includes those appraisal allowances made for requirements which the purchaser is obligated to perform under the terms of his timber sale contract.

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

35A. Road Construction

1. Engineering Costs. In this category are the expenses of engineering designed roads which may be constructed under terms of a timber sale contract. Engineering costs are not allowed for non-designed roads which require only a centerline location and grade established by the BLM.

Whenever possible, engineering costs should be obtained from local sources. Appraisers should contact three or four reliable, capable contractors (if that many are available locally) and request estimates for the road to be designed. Some reasonable cost estimates should then be developed for the appraisal.

No local costs were obtained for this schedule, but some costs used in Western Oregon are shown and can be used as local estimates. These costs were valid as of 1977, and consideration of adjustments for changes over time and local conditions should be made.

a. Survey and Design

(1) Survey. Includes P-line traverse, brushing, turning angles, chaining, referencing, running center line levels and establishing bench marks, cross sectioning, staking and supervision - $1,700/mile.

Should it be necessary to itemize any of the details included in the total survey cost, the following unit costs are suggested:

P - Line traverse -	$715/mile
P - Line profile -	$275/mile
Cross sections -	$710/mile

(2) Design. Includes Design engineering, data processing, computation of quantities and inspection and supervision - $650/mile.

b. Slope Staking - $725/mile

c. Survey, Design and Slope Staking - $3,075/mile

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

2. Move in Costs. The basic allowance covers the cost of moving the minimum essential road building equipment from one job to another. A moving distance of 30 miles is considered average. Many loggers presently use two tractors in road construction, one equipped with dozer blade and ripper (without towing winch) and one with dozer blade and towing winch. The latter machine is herein considered a logging tractor; its moving cost is excluded from the road construction move in cost allowance. See basic data, Appendix 1, page 194, for components of the basic move in allowance. If it is anticipated that additional equipment (wheel scraper, shovel, roller, dump truck, loader) will be used, the basic road construction move in allowance must be increased accordingly.

a. Basic road construction move in cost - $1029

b. Wheel scraper move in cost - $271

c. 3/4 Yard shovel move in cost - $273

d. Roller move in cost

(1) Grid roller and tractor - $219

(2) Vibratory roller and tractor - $155

e. Dump truck move in cost

(1) Medium weight dump truck - $109

f. Loader move in cost

(1) Front end loader with 2-1/2 cu. yd. bucket - $202

Basic data, Appendix 1, 193-212.

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

3. Grubbing and Clearing.

a. Definition.

(1) Grubbing. By definition, grubbing herein is the removal of stumps from the ground by any one of several methods or combination of methods. It does not include the pushing of stumps and fragments from the right-of-way.

(2) Clearing. Clearing here is the removal of loosened or fragmented stumps, brush, debris and logs (other than yarding) from the limits of construction. Decking of right-of-way logs (where necessary) is considered part of the clearing operation. Yarding of right-of-way logs is essentially a logging operation rather than a part of road construction.

b. Acreages. Grubbing and clearing acreages were computed from the average cross sections used for determining common excavation yardages on roads actually constructed. The tabular figures are slope or surface acres. These are intended for use when it is impractical to determine surface area from cross sections or by other means.

(1) Grubbing Acreages. These acreages include the area from top of cut to toe of fill by per cent of side slope. These acreages are for use when there is no separate tally of trees within the road prism. The appraiser must then compute a grubbing cost by using the average d.b.h. and number of stems per acre indicated by the cruise data.

(2) Clearing Acreages. These acreages represent the area which must be cleared for each 100' station by per cent side slope. This area is based upon the distance from a point 10 feet (on slope) above the top of the cut to a point 5 feet (on slope) below the toe of the fill.

(3) Turnout Acreages. Turnout acreages represent additional slope areas, beyond the scope of clearing for subgrades of standard width, which must be grubbed and cleared for turnout excavation. The table lists these acreages in two forms: acres per turnout and acres per station of turnout. The latter data are for use when turnout lengths vary. The number of stations of turnout may be determined by field measurement and formula:

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

Number of Stations of Turnout =

$$\frac{\text{Length of Turnout in Feet} + \text{Length of one Approach in Feet}}{100}$$

See Footnote, Chart 1 (9353.35A3b).

c. Costs.

(1) Grubbing. Costs are based upon averages for several different methods of removal, including loading and shooting with explosives, splitting with tractor attachment, and undercutting. Studies indicate that stumps of trees under 24 inches d.b.h. are usually pushed out by tractor mounted dozer, without grubbing.

(2) Clearing. Costs are based upon surface acres actually cleared. There is no apparent relationship between per cent side slope and clearing cost per acre.

Chart 1
(9353.35A 35)

GRUBBING AND CLEARING ACREAGES

% Side Slope	Acres per Station				Additional Acres - Turnouts			
	14' Subgrade 10' Usable Width		20' Subgrade 12' Usable Width		14' Subgrade 10' Usable Width 1/		20' Subgrade 12' Usable Width 2/	
	Grubbing	Clearing	Grubbing	Clearing	Acres/ Turnout	Ac/Sta.of Turnout	Acres/ Turnout	Ac/Sta.of Turnout
0	.031	.085	.078	.113	.016	.021	.046	.023
10	.051	.085	.078	.113	.016	.021	.046	.023
20	.057	.092	.078	.113	.017	.023	.056	.028
30	.060	.094	.083	.117	.026	.034	.070	.035
40	.067	.101	.090	.124	.040	.053	.110	.055
50	.076	.110	.092	.126	.050	.067	.152	.076
60	.073	.096	.122	.156	.074	.099	.120	.060
70	.073	.101	.101	.124	.033	.044	.088	.044
80	.087	.110	.115	.138	.036	.048	.102	.051
90	.099	.121	.131	.154	.057	.076	.114	.057
100	.115	.133	.154	.177	.062	.083	.128	.064

1/ Standard lengths: 50 foot turnout plus two 25 foot approaches.
2/ Standard lengths: 100 foot turnout plus two 50 foot approaches.

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

4. Excavation. Excavation here is the removal and relocation of various types of earth and rock encountered in building roads. It includes tractor and other machine work, manual labor and sometimes the drilling and blasting of rock. Yardage figures in the tables herein are based upon actual field measurements. The tables are intended for use only when computed earthwork volumes are not available for a proposed road. Tables for common excavation are based upon cut slopes of 3/4:1 for side slopes up to 50 per cent and 1/2:1 for side slopes over 50 per cent. Tables for rock excavation are based upon a 1/4:1 cut slope. Both road classes (14 foot subgrade - 10 foot usable width and 20 foot subgrade - 12 foot usable width) employ a ditch 3 feet wide as measured horizontally from ditch bottom to inside edge of roadbed.

a. Definitions.

(1) Common is that material which can be moved without blasting or ripping.

(2) Rock is that material which must be drilled and blasted, or ripped by heavy tractor with ripper attachment, before it can be moved.

b. Common Excavation - Cost per Yard. The cost is based upon time required for sidecasting the material with a maximum drift distance of 100 feet, mass canter of cut to mass center of fill. When average freehauls will exceed 100 feet, the unit costs should be appropriately increased (Table 9), or cost allowance computed for the use of a wheel scraper (Table 10).

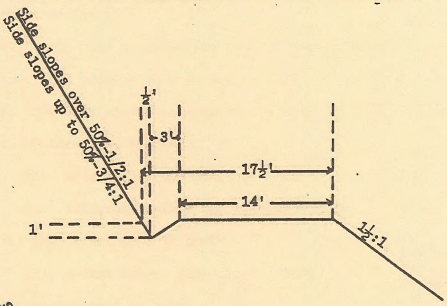
c. Rock Excavation - Cost per Yard. This is an average cost of drilling and blasting or ripping, and moving the shattered rock. This cost is based upon empirical data obtained from recent studies. These studies covered a wide range of equipment and methods, including conventional drilling and blasting. Again, the maximum drift distance was 100 feet.

9353.34 - CONTRACTUAL COSTS

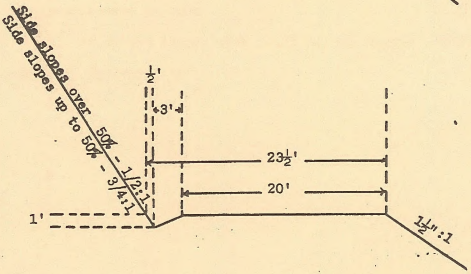
(Schedule 4)

d. Common Excavation - Cost per Station. Cubic yardages per station are included in the table for use in appraising non-designed roads. These volumes are based upon the average end areas of roads on which measurements were taken before and after construction. It may be noticed that there is considerable loss of material; these are not balanced cross sections. Average cuts at center line are included for the appraiser's information. When the actual cuts will differ appreciably from these averages, appropriate adjustments in yardage should be made. Cross sections in the studies generally conformed to the diagrams.

10' Road:



12' Road:

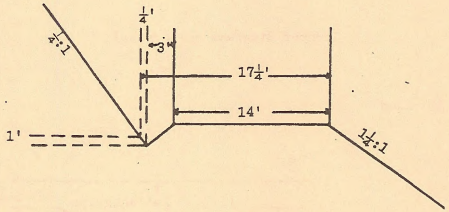


9353.35 - CONTRACTUAL COSTS

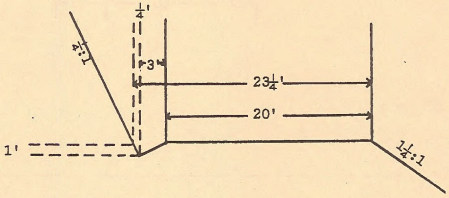
(Schedule 4)

e. Rock Excavation - Cost per Station. Costs for rock excavation are based upon the typical cross sections in the diagrams. Cubic yardages per station and average cuts at center line are included.

10' Road



12' Road



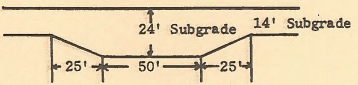
9353.35 - CONTRACTUAL COSTS

(Schedule 4)

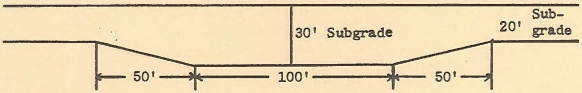
f. Turnout Excavation. End areas and cubic yardages of turnout excavation were determined from field measurements. The yardages represent the additional excavation beyond that required for the standard subgrade widths. Turnouts are 10 feet wider than the normal road width. For the 14 foot subgrade, the turnout is 50 feet long with a 25 foot approach at each end. The 20 feet subgrade requires a turnout 100 feet long, with two 50 foot approaches. The width of each approach ranges from 0 feet at the end which meets the standard subgrade to 10 feet where the approach joins the turnout.

Turnout Diagrams (plan view):

10' Road



12' Road



9353.35 CONTRACTUAL COSTS

(Schedule 4)

g. Drift Allowance. This table is intended for use as a guide for increasing tractor excavation costs when the maximum drift of material exceeds 100 feet. The percentage increases apply to tractor excavation cost only and should not be used to adjust the costs of drilling and blasting rock.

h. Excavation and End Haul. These costs are based upon the machine rates and production of a pusher tractor of 270 flywheel horsepower and a self-propelled wheel scraper hauling unit of 20 cubic yards heaped capacity. This method of moving material is adapted to distances beyond the maximum effective drift of a tractor mounted dozer. When excavation and end haul costs are used, allowance must be included for moving in the wheel scraper.

i. Shovel Excavation. Costs are based upon the use of 3/4 yard shovel. If shovel excavation is anticipated, the appraiser must include a shovel move in cost allowance.

(Schedule 4)

5. Culverts.

a. Costs in General. The cross-sectional area, usual gage and installed price per foot are given for galvanized, corrugated sheet metal culvert pipe of various types and sizes. The cost shown contains allowances for basic delivered price, connecting bands, shop elliptical forming (where necessary), structural excavation, installation and backfill.

b. Additional Costs. Additional columns showing cost of wire strutting, wood strutting, and beveling are provided. Where strutting is required, usually on larger culverts with cover heights in excess of 10', this cost should be added to the installed price per foot. As the cost of wire strutting is considerably cheaper than wooden strutting, this cost should be used where applicable. Beveling cost covers the expense of bringing both ends of the culvert to the same bevel, 2:1 or less.

c. Perforated Pipe Costs. Where perforated pipe is necessary, opinion is that 8" pipe will be adequate in nearly all cases. It is necessary to include gravel or crushed rock in the bed and backfill to assure drainage. All costs have been covered in the listed price.

9353.3 - CONTRACTUAL COSTS

(Schedule 4)

6. Grading Cost. This is based on the use of a motor grader and the time required for finishing the subgrade and pulling the ditch on subgrades up to 20 feet in width, exclusive of ditch.

Grading cost per 100 foot station - $8.06

Basic data, Appendix 1, Page 221

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

7. Surfacing. These data are for use in making appraisal allowances for road construction when procurement, hauling, spreading, and rolling of crushed aggregate or pit run rock are required under the terms of the timber sale contract.

a. Costs. The costs listed in the tables are based on the averages of BPR contracts on BLM roads. When costs other than those listed in this schedule are used, a statement of justification should appear in the appraisal.

(1) Rock. Local costs (particularly for crushed aggregate) should be used if available. The costs listed herein include no allowance for any royalties required at the source. BPR costs are the only data available for rock crushed to the same specifications as presently required by BLM timber sale contracts.

(2) Loading. Loading costs are intended as allowances where hauling from pit is contemplated.

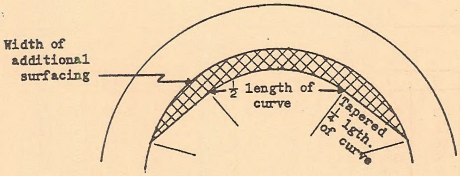
(3) Hauling. No appreciable differences were found between hauling times on "green" (non-compacted) and "solid" (compacted) roads. If the road is soft enough to impede hauling, present BLM requirements would deny the purchaser credit for surfacing prior to compaction. In effect then, there should be no hauling over "green" roads. If an unusual situation should require hauling over a soft roadbed, the appraiser should use his best judgement in estimating an adequate allowance for the additional cost.

(4) Spreading. Spreading cost is on a per lift basis; i.e., for surfacing applied in two lifts, double the allowance.

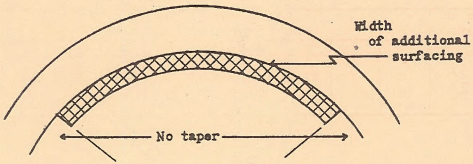
b. Volumes. The tables show volumes for various road widths and compacted depths of rock. These volumes are based on surface edges sloped at 3 to 1 and a compaction factor of 1/3. Volumes listed in the table on fill widening are based on width increases of one and two feet, on one side of centerline only. On complete fills (no bench), an allowance must be made for each side. Volumes in the table on surface widening on curves are based upon the designs diagrammed below.

9353.35 - CONTRACTUAL COSTS

(Schedule 4)



52° or greater



Less than 52°

Additional Surfacing

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

CUBIC YARDS 1/ OF AGGREGATE PER 100' STATION

Usable Surfaced Road Width-Ft.	Compacted Depth in Inches									
	2	3	4	6	8	10	12	14	16	18
10	9	13	18	28	39	51	64	78	92	107
12	10	16	21	33	46	60	74	89	105	122
14	12	18	25	38	53	68	84	101	118	137
20	17	26	35	53	72	92	113	135	158	181
24	24	31	41	63	86	109	133	158	184	211

CUBIC YARDS 1/ OF AGGREGATE PER TURNOUT 2/

Length of Turnout - Feet	Compacted Depth in Inches									
	2	3	4	6	8	10	12	14	16	18
50 3/	6	9	12	19	25	31	37	43	50	56
100 4/	12	18	24	38	50	62	74	86	99	111

CUBIC YARDS 1/ OF AGGREGATE PER 100' STATION OF TURNOUT 5/

Cu. Yds./ 100 ft.of Turnout	Compacted Depth in Inches									
	2	3	4	6	8	10	12	14	16	18
	8	12	16	25	33	41	49	57	66	74

1/ These figures are 1/3 higher than loose rock yardages (compaction allowance) and include allowance for edges sloped at 3:1.

2/ Volumes related to length of turnout only; no relationship to class of road.

3/ Includes volumes for two 25-foot approaches.

4/ Includes volumes for two 50-foot approaches.

5/ This table for use where turnout lengths vary.

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

SURFACE WIDENING ON FILLS -
CUBIC YARDS OF AGGREGATE PER 100' STATION 1/

Extra Width - Feet	Compacted Depth in Inches								
	2	3	4	6	8	10	12	14	16	18
1	1	1	2	3	3	4	5	6	7	7
2	2	3	3	5	7	8	10	12	13	15

1/ Volumes for widening on one side of centerline only. On complete fills (no bench), make allowance for both sides.

SURFACE WIDENING ON CURVES -
CUBIC YARDS OF AGGREGATE PER 100' STATION

Compacted Depth in Inches	Degree of Curve / Extra Width in Feet	8-21 / 1	22-35 / 2	36-51 / 3	52-64 / 4	65-75 / 5
2		1	2	3	3	3
3		1	3	4	4	5
4		2	3	5	5	6
6		3	5	7	7	9
8		3	7	10	10	12
10		4	8	12	12	15
12		5	10	15	15	19
14		6	12	17	17	22
16		7	13	20	20	25
18		7	15	22	22	28

9353.3 - PRODUCTION COSTS

(Schedule 4)

B. Road Maintenance. This consists of surface blading, ditch pulling, drainage upkeep and repair, slide removal, roadside brushing, roadside stabilization and gravel replacement costs. Determination of these costs as appraisal allowances should be based on condition surveys of the particular roads to be used.

1. Surfaced Roads Costs. Amortization of surface replacement (wear) costs should be based upon current State Office instructions.

The following are guidelines.

(a) Blacktop Roads (bituminous surface)

Average maintenance -	$0.113/M bd. ft./mile
Surface wear -	$0.136/M bd. ft./mile
Total	$0.249/M bd. ft./mile

(b) Gravel Roads

Average maintenance - $0.157/M bd. ft./mile

Access roads continuously maintained - $0.088/M bd. ft./mile

Timber sale mainlines and access road spurs intermittently or continously maintained - a recent study indicates that costs are higher than those for access roads. A cost of $0.30/M bd.ft./mile might be considered average.

2. Unsurfaced Roads Costs. This allowance should be sufficient to cover surface blading, ditch and culvert cleaning, slough removal and incidental work. It should not include costs of removal of major slides, heavy brush eradication or other extraordinary work.

Unsurfaced Roads - $0.125/M bd. ft./mile

3. Extraordinary Costs. Where necessary and practical, allowances may be made for watering both surface and unsurfaced roads. When slides of major proportions must be removed, additional costs must be included. Slide removal costs and the costs of eradicating heavy roadside brush should be computed by district personnel on the basis of the best local information currently available.

(a) Watering - $3.00/M gallons

9353.3 - CONTRACTUAL COSTS

(Schedule 4)

C. Fire Protection and Hazard Reduction.

1. Fire Protection. Table 1 is intended as a guide for estimating the costs of standby protection which might be required under terms of a timber sale contract. These cost allowances are based on a fire season of eight months during which the tools and equipment must be ready for use. In addition, a watchman is required part time during a four-month period in mid-summer. Since it is impossible to determine which part of the year a sale will be logged, the maximum allowance is made.

2. Hazard Reduction. The costs in Tables 3 and 4 were developed from data on 140 slash burns covering some 8024 acres of land administered by the Bureau of Land Management. The data were collected by Bureau of Land Management foresters on a wide range of conditions (Appendix 1, Page 280) in weather, topography, site, etc. Manpower and machine costs have been updated. Since manpower costs are by far the most costly item in slash burning, it was decided to determine what effect, if any slope, aspect, volume per acre, acres, per cent recovery, slash concentration, and logging methods, would have on the man hours required to burn a sale. When the analysis was completed, it was apparent that only one variable - acres, or the size of the burn - had any significance. This is not to say that other factors do not, in actual practice, affect the time required to burn. What it does mean is that there are unknown or unpredictable factors, such as weather, involved which tend to minimize the importance of the known, predictable ones.

a. Cost per MBF - Clear Cut Areas. The man hours per acre were determined on various sizes of burns and an average wage rate applied giving a labor cost per acre. Machine and fuel costs were added and the resulting burning cost per acre divided by volumes per acre to yield a cost per MBF.

b. Clear Cut Area Cost Tables. Tables 2, 3 and 4 are for use only in estimating the costs of burning clear cut areas. The term "Clear Cut Acres" is defined as the total clear cut acreage in the sale. Costs should not be applied on a unit by unit basis. These tables are constructed so that no interpolation is necessary.

c. Slash Disposal other than Clear Cut Area Burning. If good locally-based information is not available, Table 5 may be used as a guide in costing lopping and scattering, piling and burning, and chipping of slash.

9353.35 - CONTRACTUAL COSTS

(Schedule 4)

D. Environmental Protection. This category includes appraisal allowances for such measures as check damming of trails; water barring of roads; seeding, fertilizing and mulching of grass on fragile soils; and any other practice intended to safeguard water quality, minimize soil erosion, or otherwise protect the environment.

The diversity of these measures and the wide variations in intensity of their application make general cost guidelines impractical. Adequate appraisal allowances for these costs can be developed on an individual job basis as required, by estimation of machine time and man hour requirements, and local pricing of materials to be used. Appendix 1 machine and wage rate data will be useful in such estimating.

9353.3 - CONTRACTUAL COSTS

(Schedule 4)

E. Yarding of Cull Material (Gross Yarding). Contractual requirements that the purchaser remove cull material from stream channels or from cutting areas (for site preparation) involve additional expense. See 9353.33C3 for determination of appraisal allowances.

MANUAL TYP

9353.3 - PRODUCTION COSTS

(Schedule 4)

TIMBER APPRAISAL PRODUCTION
COST TABLES

Illustration 1 - Falling and Bucking

Tables 1-4 All Operations

Illustration 2 - Rigging, Yarding and Loading

Tables 1-12 Tractor Operations
13-21 Low Ground Pressure Tractor Operations
22-29 Highlead Operations
30-32 Static Skyline Operations
33-36 Swinging Operations
37-42 Mobile Yarder- Loader Operations
43-47 Commercial Thinning Operations

Illustration 3 - Transportation

Tables 1-2 Log Truck Hauling and Delay

Illustration 4 - Contractual Costs

Tables 1-3 Move in, Clearing and Grubbing
4-12 Excavation
12-18 Culverts
19-20 Surfacing and Maintenance

Illustration 5 - Fire Protection and Hazard Reduction

Tables 1-5 Fuel Treatment Practices

Illustration 1
(.34A)

Falling and Bucking

Costs in Dollars Per MBF Gross Volume 1/ 3/ 4/

TABLE 1

No. of 16. Logs	Percent Top Loss 2/										
	0	5	10	15	20	25	30	35	40	45	50
1	15.30	15.15	14.95	14.80	14.65	14.50	14.35	14.15	14.00	13.85	13.70
2	12.50	12.35	12.20	12.00	11.85	11.70	11.55	11.40	11.25	11.05	10.90
3	10.10	9.95	9.75	9.60	9.45	9.30	9.15	8.95	8.80	8.65	8.50
4	8.05	7.90	7.75	7.55	7.40	7.25	7.10	6.95	6.75	6.60	6.45
5	6.35	6.20	6.05	5.90	5.75	5.60	5.40	5.25	5.10	4.95	4.80
6	5.05	4.90	4.75	4.60	4.45	4.25	4.10	3.95	3.80	3.65	3.50
7	4.15	4.00	3.80	3.65	3.50	3.35	3.20	3.00	2.85	2.70	2.55
8	3.55	3.40	3.25	3.10	2.95	2.75	2.60	2.45	2.30	2.15	2.00
9	3.40	3.20	3.05	2.90	2.75	2.60	2.40	2.25	2.10	1.95	1.80

1/ Subtract $0.10 for every 7 stems per acre.
2/ Per cent top loss is the estimated average volume loss in the upper stem from breakage and rot expressed as a percent of gross volume. This estimate is made by the cruiser.
3/ If lopping of unmerchantable tops is to be required, increase tabular costs by a factor of 1.15.
4/ Directional Fellings: Tree jacks - adjust tabular costs by factor of 2.00.
Tree pulling - adjust tabular costs by factor of 3.00.

Basic Data, Appendix 1, Pages 73, 74 and 248.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 2
UNMERCHANTABLE TREE AND SNAG FALLING

D.B.H.	Costs in Dollars per Stem 1/
8	.85
12	1.45
16	2.00
20	2.60
24	3.20
28	3.75
32	4.35
36	4.90
40	5.50
44	6.05
48	6.65
52	7.25
56	7.80
60	8.40
64	8.95
68	9.55
72	10.15
76	10.70
80	11.30
84	11.85
88	12.45
92	13.00
96	13.60
100	14.20

1/ To nearest five cents.

Basic data, Appendix 1, pages 73, 74 and 249.

Falling and Bucking - Commercial Thinning

Costs in Dollars/tree 1/ 2/

TABLE 3

Number of 16-Foot Logs to 5-Inch Top

D.B.H. Inches	1	2	3	4	5	6	7	8	9	10	11
8	2.30	2.30	2.90	2.90							
10	2.50	2.50	3.15	3.15	3.75						
12	2.80	2.80	3.40	3.40	4.00	4.00					
14	3.10	3.10	3.70	3.70	4.35	4.35	4.95				
16	3.45	3.45	4.05	4.05	4.70	4.70	5.30	5.30			
18		3.85	4.50	4.50	5.10	5.10	5.70	5.70	6.35		
20		4.30	4.90	4.90	5.55	5.55	6.20	6.20	6.80	6.80	
22		4.80	5.45	5.45	6.05	6.05	6.70	6.70	7.30	7.30	
24		5.35	6.00	6.00	6.60	6.60	7.20	7.20	7.85	7.85	8.45
26			6.60	6.60	7.20	7.20	7.80	7.80	8.45	8.45	9.05
28			7.20	7.20	7.85	7.85	8.45	8.45	9.10	9.10	9.70
30			7.90	7.90	8.55	8.55	9.15	9.15	9.80	9.80	10.40

1/ Costs are governed by number of bucking cuts, with 32-foot log length as standard for each cut.

2/ If lopping of unmerchantable tops is to be required, increase tabular costs by a factor of 1.20

BASIC DATA, APPENDIX 1, PAGES 75, 76 and 250.

Illustration 1
(.32D)

9353.3 - PRODUCTION COSTS

(Schedule 4)

FALLING AND BUCKING - SELECTIVE CUTS

TABLE 4

Costs in Dollars Per MBF Net Merchantable Volume 1/ 3/

Percent of Recovery 2/	
100	9.45
95	9.80
90	10.15
85	10.50
80	10.85
75	11.20
70	11.55
65	11.90
60	12.25
55	12.60
50	12.95

1/ To nearest five cents.

2/ Percent recovery expressed as the ratio of net merchantable volume to gross merchantable.

3/ If lopping of merchantable tops is to be required as a slash disposal measure, increase tabular costs by a factor of 1.15.

Basic Data, Appendix 1, Pages 73, 74.

9353.3 - PRODUCTION COSTS

(Schedule 4)

RIGGING, YARDING AND LOADING

TABLE 1

MOVE-IN LOGGING EQUIPMENT 1/

Machine	Move-in Allowances
Light Yarding Tractor	
Caterpillar D4D w/dozer and winch	$ 95
Yarding Crawler Tractor	
Caterpillar D76 w/power shift	$ 365
FMC 219 CA	$ 300
Rubber-tired Four-wheel skidder	
John Deere - 440 B	$ 90
Swing Boom Yarder	
Washington 78A	$ 455
Yarder-Portable 90' Tower	
Trailer Mounted with Berger Yarder	$ 385
Yarder Portable 110' Tower	
Trailer Mounted with Skagit Yarder	$ 870
Static Skyline - Portable 110' Tower	
Skagit BU98 Yarder (Distance 125 miles)	$2965
Static Skyline - (move in costs per mile)	
Skyline 23.70/mile	
Yarder tractor 4.50/mile	
Mobile loader 8.05/mile	
Mobile Yarder Loader	
Skagit SJ-5R	$ 265
Light Mobile Log Loader	
Barko Model 160	$ 60
Heavy Mobile Log Loader Barko 450 - Tracked	$ 560
Hydrolic " " Barko 450 - Rubber tired	$ 435
Front End Log Loader - Rubber-tired	
Caterpillar 966C	$ 135

Basic Data, Appendix 1, Pages 77-102

Yarding - Clear Cut Tractor Operations

Costs in Dollars per MBF Gross Volume Yarded

TABLE 2

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 1/ 2/ 3/									
	100	200	300	400	500	600	700	800	900	1000
8	34.05	34.60	35.15	35.70	36.25	36.80	37.35	37.90	38.45	39.00
10	28.17	28.75	29.30	29.80	30.40	30.95	31.50	32.05	32.60	33.15
12	23.40	23.95	24.50	25.05	25.60	26.15	26.70	27.25	27.80	28.35
14	19.50	20.05	20.60	21.15	21.70	22.25	22.80	23.35	23.90	24.45
16	16.30	16.85	17.40	17.95	18.50	19.05	19.60	20.15	20.70	21.30
18	13.70	14.25	14.80	15.35	15.90	16.45	17.00	17.56	18.10	18.65
20	11.60	12.15	12.70	13.25	13.80	14.35	14.90	15.45	16.00	16.55
22	9.85	10.40	10.95	11.50	12.05	12.65	13.20	13.75	14.30	14.85
24	8.45	9.00	9.60	10.10	10.70	11.25	11.80	12.35	12.90	13.45
26	7.35	7.90	8.45	8.95	9.55	10.10	10.65	11.20	11.80	12.30
28	6.40	7.00	7.55	8.10	8.65	9.20	9.75	10.30	10.85	11.40
30	5.70	6.25	6.80	7.35	7.90	8.45	9.00	9.55	10.10	10.65
35	4.45	5.00	5.55	6.10	6.65	7.20	7.75	8.30	8.85	9.40
40	3.75	4.30	4.85	5.40	5.95	6.50	7.05	7.60	8.15	8.70
45	3.35	3.95	4.50	5.05	5.60	6.15	6.70	7.25	7.80	8.35
50	3.20	3.80	4.35	4.90	5.45	6.00	6.55	7.10	7.65	8.20
55	3.20	3.75	4.30	4.85	5.40	6.00	6.50	7.05	7.65	8.20
60	3.25	3.80	4.35	4.90	5.45	6.00	6.55	7.10	7.70	8.25
65	3.35	3.90	4.45	5.00	5.55	6.10	6.65	7.20	7.75	8.35
70	3.45	4.05	4.60	5.15	5.70	6.25	6.80	7.35	7.90	8.45
75	3.60	4.15	4.70	5.30	5.85	6.40	6.95	7.50	8.05	8.60
80	3.75	4.35	4.90	5.45	6.00	6.55	7.10	7.65	8.20	8.75

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ Distance logs actually travel from choker setting point to the landing.
3/ For distances exceeding 1,000', add $0.35 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 103, 104 and 252.

Loading With Mobile Loader (Grapple) - Clear Cut Tractor

Costs in Dollars per MBF Gross Volume Loaded 1/

TABLE 3

Yarding Distance in Feet 2/ 3/

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet									
	100	200	300	400	500	600	700	800	900	1000
8	8.00	8.10	8.25	8.40	8.50	8.65	8.80	8.90	9.05	9.15
10	6.60	6.75	6.90	7.00	7.15	7.25	7.40	7.50	7.65	7.80
12	5.50	5.60	5.75	5.90	6.00	6.15	6.30	6.40	6.55	6.65
14	4.55	4.70	4.85	4.95	5.10	5.20	5.35	5.50	5.60	5.75
16	3.80	3.95	4.10	4.20	4.35	4.45	4.60	4.75	4.85	5.00
18	3.20	3.35	3.50	3.60	3.75	3.85	4.00	4.10	4.25	4.40
20	2.70	2.85	3.00	3.10	3.25	3.35	3.50	3.60	3.75	3.90
22	2.30	2.45	2.55	2.70	2.85	2.95	3.10	3.20	3.35	3.50
24	2.00	2.10	2.25	2.40	2.50	2.65	2.75	2.90	3.05	3.15
26	1.80	1.80	2.00	2.10	2.25	2.35	2.50	2.65	2.75	2.90
28	1.80	1.80	1.80	1.90	2.05	2.15	2.30	2.40	2.55	2.70
30	1.80	1.80	1.80	1.80	1.85	2.00	2.10	2.25	2.40	2.50
35	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.95	2.08	2.21
40	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.90	2.05
45	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.85	1.95
50	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.95
55	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.90
60	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.95
65	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.95
70	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	2.00
75	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	2.00
80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	2.05

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ Distance logs actually travel from choker setting point to the landing.
3/ For distances exceeding 1,000', and $0.15 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 107, 108 and 252.

Loading With Front End Log Loader - Clear Cut Tractor Operations

Costs in Dollars Per MBF Gross Volume Yarded and Loaded 1/

TABLE 4

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 2/ 3/									
	100	200	300	400	500	600	700	800	900	1000
8	7.60	7.70	7.85	7.95	8.10	8.20	8.30	8.45	8.55	8.70
10	6.30	6.40	6.50	6.65	6.75	6.90	7.00	7.15	7.25	7.40
12	5.20	5.35	5.45	5.60	5.70	5.85	5.95	6.05	6.20	6.30
14	4.35	4.45	4.60	4.70	4.80	4.95	5.10	5.20	5.30	5.45
16	3.65	3.75	3.90	4.00	4.10	4.25	4.35	4.50	4.60	4.75
18	3.05	3.15	3.30	3.40	3.55	3.65	3.80	3.90	4.05	4.15
20	2.60	2.70	2.85	2.95	3.05	3.20	3.30	3.45	3.55	3.70
22	2.20	2.30	2.45	2.50	2.70	2.80	2.95	3.05	3.20	3.30
24	1.90	2.00	2.15	2.25	2.40	2.50	2.60	2.75	2.90	3.00
26	1.65	1.75	1.90	2.00	2.15	2.25	2.35	2.50	2.60	2.75
28	1.45	1.55	1.70	1.80	1.90	2.05	2.15	2.30	2.40	2.55
30	1.45	1.45	1.50	1.65	1.75	1.90	2.00	2.15	2.25	2.40
35	1.45	1.45	1.45	1.45	1.50	1.60	1.75	1.85	1.95	2.10
40	1.45	1.45	1.45	1.45	1.45	1.45	1.55	1.70	1.80	1.95
45	1.45	1.45	1.45	1.45	1.45	1.45	1.50	1.60	1.75	1.85
50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.60	1.70	1.85
55	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.60	1.70	1.80
60	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.60	1.70	1.85
65	1.45	1.45	1.45	1.45	1.45	1.45	1.50	1.60	1.75	1.85
70	1.45	1.45	1.45	1.45	1.45	1.45	1.50	1.65	1.75	1.90
75	1.45	1.45	1.45	1.45	1.45	1.45	1.55	1.65	1.80	1.90
80	1.45	1.45	1.45	1.45	1.45	1.45	1.60	1.70	1.85	1.95

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ Distance logs actually travel from choker setting point to the landing.
3/ For distances exceeding 1,000', add $0.15 for each additional 100' of yarding distance.

Basic Data, Appendix 1, Pages 111, 112 and 181.

Partial Cut Yarding - Tractor Operations

Costs in Dollars Per MBF Gross Volume Yarded 1/ 2/

TABLE 5

Yarding Distance in Feet 3/ 4/

16 Ft. Log Volume Scrib. Dec.C.	100	200	300	400	500	600	700	800	900	1000
8	50.45	51.50	52.50	53.55	54.60	55.65	56.65	57.70	58.75	59.80
10	43.25	44.30	45.35	46.35	47.40	48.45	49.50	50.50	51.55	52.60
12	37.30	38.35	39.40	40.45	41.45	42.50	43.55	44.60	45.60	46.65
14	32.40	33.45	34.50	35.50	36.55	37.60	38.65	39.65	40.70	41.75
16	28.35	29.40	30.40	31.45	32.50	33.55	34.55	35.60	36.65	37.70
18	24.95	26.00	27.05	28.10	29.10	30.15	31.20	32.20	33.25	34.30
20	22.15	23.20	24.20	25.25	26.30	27.35	28.35	29.40	30.45	31.45
22	19.80	20.80	21.85	22.90	23.95	24.95	26.00	27.05	28.10	29.10
24	17.80	18.85	19.90	20.90	21.95	23.00	24.00	25.05	26.10	27.15
26	16.15	17.15	18.20	19.25	20.30	21.30	22.35	23.40	24.45	25.45
28	14.70	15.75	16.80	17.80	18.85	19.90	20.95	21.95	23.00	24.05
30	13.50	14.55	15.55	16.60	17.65	18.70	19.70	20.75	21.80	22.85
35	11.15	12.20	13.20	14.25	15.30	16.35	17.35	18.40	19.45	20.50
40	9.45	10.50	11.50	12.55	13.60	14.65	15.65	16.70	17.75	18.80
45	8.15	9.20	10.20	11.25	12.30	13.35	14.35	15.40	16.45	17.50
50	7.10	8.10	9.15	10.20	11.25	12.25	13.30	14.35	15.40	16.40
55	6.15	7.20	8.25	9.30	10.30	11.35	12.40	13.40	14.45	15.50
60	5.35	6.35	7.40	8.45	9.50	10.50	11.55	12.60	13.65	14.65
65	4.55	5.60	6.65	7.65	8.70	9.75	10.80	11.80	12.85	13.90
70	3.80	4.85	5.90	6.95	7.95	9.00	10.05	11.10	12.10	13.15
75	3.10	4.15	5.15	6.20	7.25	8.30	9.30	10.35	11.40	12.45
80	2.40	3.45	4.45	5.50	6.55	7.60	8.60	9.65	10.70	11.70

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.

2/ The cost per MBF Gross Volume from the two tables must be combined before the weighted partial cut tractor yarding cost calculation is made. Special note must be made of the algebraic sign which appears in the second table.

3/ Yarding distance is the average straight line slope distance from choker setting point to the landing. Do not add a factor for weave.

4/ For distances exceeding 1,000', and $0.60 for each additional 100' of yarding distance.

* Salvage pickup - tabular costs, including plus and minus figures in table 8B, by factor or 0.832. For distances exceeding 100', and $0.50 for each additional 100' of yarding distances.

Illustration 2
(.3305)

Partial Cut Yarding - Tractor Operations

Costs in Dollars Per MBF Gross Volume Yarded 2/

TABLE 5 (cont'd.)

Number of Merchantable Stems Marked Per Acre 5/

% Slope	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-1.45	-1.75	-2.05	-2.35	-2.65	-2.95	-3.25	-3.55	-3.80	-4.10	-4.40	-4.70	-5.00	-5.30
5	-.64	-.95	-1.25	-1.50	-1.80	-2.10	-2.40	-2.70	-3.00	-3.30	-3.60	-3.90	-4.15	-4.45
10	.20	-.10	-.40	-.70	-1.00	-1.30	-1.60	-1.85	-2.15	-2.45	-2.75	-3.05	-3.35	-3.65
15	1.00	.70	.45	.15	-.15	-.45	-.75	-1.05	-1.35	-1.65	-1.95	-2.20	-2.50	-2.80
20	1.85	1.55	1.25	.95	.65	.35	.10	-.20	-.50	-.80	-1.10	-1.40	-1.70	-2.00
25	2.65	2.40	2.05	1.80	1.50	1.20	.90	.60	.30	.00	-.25	-.55	-.85	-1.15
30	3.50	3.20	2.90	2.60	2.30	2.05	1.75	1.45	1.15	.85	.55	.25	-.05	-.30
35	4.35	4.05	3.75	3.45	3.15	2.85	2.55	2.25	2.00	1.65	1.40	1.10	.80	.50
40	5.15	4.85	4.55	4.30	4.00	3.70	3.40	3.10	2.80	2.50	2.20	1.90	1.65	1.35
45	6.00	5.70	5.40	5.10	4.80	4.50	4.20	3.95	3.65	3.35	3.05	2.75	2.45	2.15
50	6.80	6.50	6.25	5.95	5.65	5.35	5.05	4.75	4.45	4.15	3.85	3.60	3.30	3.00
55	7.65	7.35	7.05	6.75	6.45	6.15	5.90	5.60	5.30	5.00	4.70	4.40	4.10	3.80
60	8.45	8.20	7.90	7.60	7.30	7.00	6.70	6.40	6.10	5.80	5.55	5.25	4.95	4.05

5/ Marked stems - this is the number of merchantable stems marked per acre within the yarding area.
6/ Slope - this is the average slope in per cent of the area being logged as estimated by the cruiser.

Basic Data, Appendix 1, pages 103, 104, 109, 110, 254 and 255.

Loading With Mobile Loaders - Partial Cut Tractor

Costs in Dollars Per MBF Gross Volume Loaded 1/ 2/

TABLE 6

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	11.85	12.10	12.30	12.55	12.80	13.05	13.30	13.55	13.75	14.00
10	10.15	10.40	10.65	10.90	11.10	11.35	11.60	11.85	12.10	12.35
12	8.75	9.00	9.25	9.50	9.75	10.00	10.20	10.45	10.70	10.95
14	7.60	7.85	8.10	8.35	8.60	8.80	9.05	9.30	9.55	9.80
16	6.65	6.90	7.15	7.40	7.60	7.85	8.10	8.35	8.60	8.85
18	5.85	6.10	6.35	6.60	6.85	7.05	7.30	7.55	7.80	8.05
20	5.20	5.45	5.70	5.90	6.15	6.40	6.65	6.90	7.15	7.40
22	4.65	4.90	5.15	5.35	5.60	5.85	6.10	6.35	6.60	6.85
24	4.20	4.40	4.65	4.90	5.15	5.40	5.65	5.90	6.10	6.35
26	3.80	4.05	4.25	4.50	4.75	5.00	5.25	5.50	5.75	5.95
28	3.45	3.70	3.95	4.20	4.40	4.65	4.90	5.15	5.40	5.65
30	3.45	3.45	3.65	3.90	4.15	4.35	4.65	4.90	5.10	5.35
35	3.45	3.45	3.45	3.45	3.60	3.85	4.05	4.30	4.55	4.80
40	3.45	3.45	3.45	3.45	3.45	3.45	3.70	3.90	4.15	4.40
45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.60	3.85	4.10
50	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.60	3.85
55	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.65
60	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45
65	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45
70	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45
75	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45
80	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.

2/ The cost per MBF gross volume from the two tables must be combined before the weighted partial cut tractor yarding cost calculation is made. Special note must be made of the algebraic sign which appears in the second table.

3/ Yarding distance is the average straight line slope distance from choker setting point to the landing. Do not add a factor for weave.

4/ For distances exceeding 1,000', and $0.25 for each additional 100' of yarding distance.

* Salvage pickup - tabular costs, including plus and minus figures in table 8B, by factor of 0.832.
For distances exceeding 1000', and $0.20 for each additional 100' of yarding distances.

Illustration 2
(.330A)

Loading With Mobile Loader (Grapple) - Partial Cut Tractor Operstions

Costs in Dollars Per MBF Gross Volume Loaded 2/

TABLE 6 (cont'd.)

Number of Merchantable Stems Marked Per Acre 5/

Per Cent Slope 5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-.35	-.45	-.50	-.60	-.65	-.75	-.80	-.90	-.95	-1.05	-1.10	-1.20	-1.25	-1.35
5	-.15	-.25	-.30	-.40	-.45	-.55	-.60	-.70	-.75	- .85	- .90	-1.00	-1.05	-1.15
10	.05	-.05	-.10	-.20	-.25	-.35	-.40	-.50	-.55	- .65	- .70	- .80	- .85	- .90
15	.25	.20	.10	.05	-.05	-.10	-.20	-.25	-.35	- .40	- .50	- .55	- .65	- .70
20	.45	.40	.30	.25	.15	.10	.00	-.05	-.15	- .20	- .30	- .35	- .45	- .50
25	.70	.60	.55	.45	.40	.30	.25	.15	.10	.00	- .05	- .15	- .20	- .30
30	.90	.80	.75	.65	.60	.50	.45	.35	.30	.20	.15	.05	.00	- .10
35	1.10	1.05	.95	.90	.80	.75	.65	.60	.50	.45	.35	.30	.20	.15
40	1.30	1.25	1.15	1.10	1.00	.95	.85	.80	.70	.65	.55	.50	.40	.35
45	1.50	1.45	1.35	1.30	1.20	1.15	1.05	1.00	.90	.85	.75	.70	.60	.55
50	1.75	1.65	1.60	1.50	1.45	1.35	1.30	1.20	1.15	1.05	1.00	.90	.85	.75
55	1.95	1.85	1.80	1.70	1.65	1.55	1.50	1.40	1.35	1.25	1.20	1.10	1.05	.95
60	2.15	2.10	2.00	1.95	1.85	1.80	1.70	1.65	1.55	1.50	1.40	1.35	1.25	1.20

5/ Marked stems - this is the number of merchantable stems marked per acre within the yarding area.
6/ Slope - this is the average slope in per cent of the area being logged as estimated by the cruiser.

Basic Data, Appendix 1, pages 107, 108, 111, 112, 254 and 255.

Reduce to 8 inches B.M.

Front End Loader Hot Deck Loading

Costs in Dollars Per MBF Gross Volume Yarded 1/ 2/

TABLE 7

16 Ft. Log Volume Scrib. Dec.C.	Load Size MBF									
	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
8	4.05	3.90	3.75	3.55	3.35	3.20	3.05	3.00	2.95	2.95
10	3.95	3.80	3.65	3.45	3.25	3.10	2.95	2.90	2.85	2.85
12	3.85	3.70	3.55	3.35	3.15	3.00	2.85	2.80	2.75	2.75
14	3.80	3.65	3.45	3.25	3.05	2.90	2.80	2.70	2.65	2.65
16	3.70	3.55	3.35	3.15	3.00	2.85	2.70	2.65	2.60	2.60
18	3.65	3.50	3.30	3.10	2.90	2.75	2.65	2.55	2.50	2.50
20	3.55	3.40	3.25	3.05	2.85	2.70	2.55	2.50	2.45	2.45
22	3.50	3.35	3.15	2.95	2.80	2.60	2.50	2.40	2.40	2.40
24	3.45	3.30	3.10	2.90	2.70	2.55	2.45	2.35	2.35	2.35
26	3.40	3.25	3.05	2.85	2.65	2.50	2.40	2.30	2.30	2.30
28	3.35	3.20	3.00	2.80	2.60	2.45	2.35	2.25	2.25	2.25
30	3.30	3.15	2.95	2.75	2.60	2.40	2.30	2.20	2.20	2.20
35	3.20	3.05	2.85	2.70	2.50	2.35	2.20	2.15	2.10	2.10
40	3.15	3.00	2.80	2.60	2.45	2.25	2.15	2.05	2.05	2.05
45	3.10	2.95	2.75	2.55	2.40	2.25	2.10	2.05	2.00	2.00

1/ Includes allowance of $1.90 (6 minutes) per load for positioning truck and trailer and coupling reach, and binding load. Also includes an allowance of $4.12 (13 minutes) per load for hauling delay (no truck at landing) and an allowance of $0.95 (3 minutes) per load for yarding delay (no log at landing) and miscellaneous delay. Delay Cost/MBF = (load delay time (minutes) times $0.317) divided by load volume (MBF).

2/ In those cases where volumes exceed those listed, use the cost of the largest log volume.

Basic data, appendix 1, pages 185, 191 and 255.

Yarding - Selective Cut Tractor Operations

Costs in Dollars Per MBF Gross Volume Yarded 1/

TABLE 8

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 2/ 3/									
	100	200	300	400	500	600	700	800	900	1000
4	22.05	22.55	23.05	23.55	24.05	24.50	25.00	25.50	26.00	26.50
6	20.90	21.40	21.90	22.40	22.90	23.40	23.90	24.40	24.90	25.40
8	19.80	20.30	20.80	21.30	21.80	22.30	22.80	23.30	23.80	24.30
10	18.75	19.25	19.75	20.25	20.75	21.20	21.70	22.20	22.70	23.20
12	17.70	18.20	18.70	19.20	19.70	20.20	20.70	21.15	21.65	22.15
14	16.70	17.20	17.05	18.15	18.65	19.15	19.65	20.15	20.65	21.15
16	15.70	16.20	16.70	17.20	17.65	18.20	18.70	19.15	19.65	20.15
18	14.75	15.25	15.75	16.25	16.70	17.20	17.70	18.20	18.70	19.20
20	13.80	14.30	14.80	15.30	15.80	16.30	16.80	17.30	17.80	18.30
22	12.90	13.40	13.90	14.40	14.90	15.40	15.90	16.40	16.90	17.35
24	12.05	12.50	13.00	13.50	14.00	14.50	15.00	15.50	16.00	16.50
26	11.20	11.70	12.15	12.65	13.15	13.65	14.15	14.65	15.15	15.65
28	10.35	10.85	11.35	11.85	12.35	12.85	13.35	13.85	14.35	14.85
30	9.55	10.05	10.55	11.05	11.55	12.05	12.55	13.05	13.55	14.05
32	8.80	9.30	9.80	10.30	10.80	11.30	11.80	12.30	12.80	13.30
34	8.05	8.55	9.05	9.55	10.05	10.55	11.05	11.55	12.05	12.55
36	7.35	7.85	8.35	8.85	9.35	9.85	10.35	10.85	11.35	11.85
38	6.70	7.20	7.60	8.20	8.70	9.15	9.65	10.15	10.65	11.15
40	6.05	6.55	7.05	7.55	8.05	8.50	9.00	9.50	10.00	10.50
42	5.40	5.90	6.40	6.90	7.40	7.90	8.40	8.90	9.40	9.90

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ Distance logs actually travel from choker setting point to the landing.
3/ For distances exceeding 1,000', add $0.30 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 103, 104 and 156.

Yarding and Loading - Partial Cut Tractor Operations

Costs in Dollars Per MBF Gross Volume Yarded and Loaded 1/ 2/

TABLE 9

Yarding Distance in Feet 3/ 4/

16 Ft. Log Volume Scrib. Dec.C.	100	200	300	400	500	600	700	800	900	1000
8	62.30	63.55	64.85	66.10	67.40	68.65	69.95	71.25	72.50	73.80
10	53.40	54.70	55.95	57.25	58.55	59.80	61.10	62.35	63.65	64.95
12	46.10	47.35	48.65	49.90	51.20	52.50	53.75	55.05	56.30	57.60
14	40.00	41.30	42.60	43.85	45.15	46.40	47.70	49.00	50.25	51.55
16	35.00	36.25	37.55	38.85	40.10	41.40	42.65	43.95	45.25	46.50
18	30.80	32.10	33.40	34.65	35.95	37.20	38.50	39.80	41.05	42.35
20	27.35	28.60	29.90	31.20	32.45	33.75	35.00	36.30	37.60	38.85
22	24.40	25.70	27.00	28.25	29.55	30.85	32.10	33.40	34.65	35.95
24	22.00	23.25	24.55	25.80	27.10	28.40	29.65	30.95	32.20	33.50
26	19.90	21.20	22.50	23.75	25.05	26.30	27.60	28.90	30.15	31.45
28	18.15	19.45	20.70	22.00	23.30	24.55	25.85	27.10	28.40	29.70
30	16.95	17.95	19.25	20.50	21.80	23.05	24.85	25.65	26.90	28.20
35	14.60	15.65	16.30	17.60	18.90	20.15	21.45	22.70	24.00	25.30
40	12.90	13.95	14.95	15.50	16.80	18.05	19.35	20.60	21.90	23.20
45	11.60	12.65	13.65	14.70	15.20	16.45	17.75	19.00	20.30	21.60
50	10.55	11.55	12.60	13.65	14.70	15.70	16.40	17.70	19.00	20.25
55	9.60	10.65	11.70	12.75	13.75	14.80	15.85	16.85	17.90	19.15
60	8.80	9.80	10.85	11.90	12.95	13.95	15.00	16.05	17.10	18.15
65	8.00	9.05	10.10	11.10	12.15	13.20	14.25	15.25	16.30	17.35
70	7.25	8.30	9.35	10.40	11.40	12.45	13.50	14.55	15.55	16.60
75	6.55	7.60	8.60	9.65	10.70	11.75	12.75	13.80	14.85	15.90
80	5.85	6.90	7.90	8.95	10.00	11.05	12.05	13.10	14.15	15.15

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.

2/ The cost per MBF gross volume from the two tables must be combined before the weighted partial cut tractor yarding cost calculation is made. Special note must be made of the algebraic sign which appears in the second table.

3/ Yarding distance is the average straight line slope distance from choker setting point to the landing. Do not add a factor for weave.

4/ For distances exceeding 1,000', add $0.65 for each additional 100' of yarding distance.

Yarding and Loading - Partial Cut Tractor Operations

Costs in Dollars Per MBF Gross Volume Yarded and Loaded 2/

TABLE 9 (cont'd.)

Number of Merchantable Stems Marked Per Acre 5/

Per Cent Slope 6/	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-1.85	-2.20	-2.60	-2.95	-3.30	-3.70	-4.05	-4.45	-4.80	-5.15	-5.55	-5.90	-6.25	-6.65
5	- .80	-1.15	-1.55	-1.90	-2.30	-2.65	-3.00	-3.50	-3.75	-4.15	-4.50	-4.85	-5.25	-5.60
10	.25	- .15	- .50	- .85	-1.25	-1.60	-2.00	-2.35	-2.70	-3.10	-3.45	-3.80	-4.20	-4.55
15	1.25	.90	.55	.15	- .20	- .55	- .95	-1.30	-1.70	-2.05	-2.40	-2.80	-3.15	-3.50
20	2.30	1.95	1.60	1.20	.85	.45	.10	- .25	- .65	-1.00	-1.40	-1.75	-2.10	-2.50
25	3.35	3.00	2.60	2.25	1.90	1.50	1.15	.75	.40	.05	- .35	- .70	-1.10	-1.45
30	4.40	4.00	3.65	3.30	2.90	2.55	2.20	1.80	1.45	1.05	.70	.35	-.05	-.40
35	5.45	5.05	4.70	4.30	3.95	3.60	3.20	2.85	2.50	2.10	1.75	1.35	1.00	.65
40	6.45	6.10	5.75	5.35	5.00	4.60	4.25	3.90	3.50	3.15	2.80	2.40	2.05	1.65
45	7.50	7.15	6.75	6.40	6.05	5.65	5.30	4.90	4.55	4.20	3.80	3.45	3.10	2.70
50	8.55	8.20	7.80	7.45	7.05	6.70	6.35	5.95	5.60	5.25	4.85	4.50	4.10	3.75
55	9.60	9.20	8.85	8.50	8.10	7.75	7.35	7.00	6.65	6.25	5.90	5.55	5.15	4.80
60	10.65	10.25	9.90	9.50	9.15	8.80	8.40	8.05	7.65	7.30	6.95	6.55	6.20	5.85

5/ Marked stems - this is the number of merchantable stems marked per acre within the yarding area.
6/ Slope - this is the average slope in per cent of the area being logged as estimated by the cruiser.

Basic data, appendix 1, pages 103, 104, 254.

9353.3 - PRODUCTION COSTS

(Schedule 4)

RIGGING, YARDING AND LOADING

TABLE 10

TRACTOR RIGGING
(Includes Use For Low Ground Pressure Tractor)
CLEAR CUT AND PARTIAL CUT

Includes: 2 yarding tractors
Large mobile log loader
6 man yarding & loading crew

First Landing	$355
1/ Additional Landings	$120 (each)

FOR SALVAGE PICKUP

Includes: 1 yarding tractor
1 front end loader
3 man yarding and loading crew

First Landing	$310
1/ Additional Landings	$120 (each)

1/ If landings are more than 1/2 mile apart, allow $60 for each additional 1/4 mile.

Move-in costs not included. See Table 1 for appropriate move-in costs. These rigging costs are suggested as guidelines. The appraiser should judge each logging situation individually and develop appropriate rigging costs.

Basic Data, Appendix 1, Pages 113 thru 120.

Loading - Mobile Loader(Grapple) - Selective Cut Tractor Operations

Costs in Dollars Per MBF Gross Volume Loaded 1/ 2/

TABLE 11

Yarding Distance in Feet 3/ 4/

16 Ft. Log Volume Scrib. Dec.C.	100	200	300	400	500	600	700	800	900	1000
4	5.15	5.30	5.40	5.50	5.65	5.75	5.85	6.00	6.10	6.20
6	4.90	5.00	5.15	5.25	5.35	5.50	5.60	5.70	5.85	5.95
8	4.65	4.75	4.90	5.00	5.10	5.25	5.35	5.45	5.60	5.70
10	4.40	4.50	4.65	4.75	4.85	5.00	5.10	5.20	5.35	5.45
12	4.15	4.30	4.40	4.50	4.60	4.75	4.85	4.95	5.10	5.20
14	3.90	4.05	4.15	4.25	4.40	4.50	4.60	4.75	4.85	4.95
16	3.70	3.80	3.90	4.05	4.15	4.25	4.40	4.50	4.60	4.75
18	3.45	3.55	3.70	3.80	3.90	4.05	4.15	4.25	4.40	4.50
20	3.25	3.35	3.45	3.60	3.70	3.80	3.95	4.05	4.15	4.30
22	3.05	3.15	3.25	3.40	3.50	3.60	3.75	3.85	3.95	4.10
24	2.80	2.95	3.05	3.15	3.30	3.40	3.50	3.65	3.75	3.85
26	2.60	2.75	2.85	2.95	3.10	3.20	3.30	3.45	3.55	3.65
28	2.45	2.55	2.65	2.80	2.90	3.00	3.15	3.25	3.35	3.50
30	2.25	2.35	2.50	2.60	2.70	2.85	2.95	3.05	3.20	3.30
32	2.05	2.20	2.30	2.40	2.55	2.65	2.75	2.90	3.00	3.10
34	1.90	2.00	2.15	2.25	2.35	2.50	2.60	2.70	2.85	2.95
36	1.75	1.85	1.95	2.10	2.20	2.30	2.45	2.55	2.65	2.80
38	1.55	1.70	1.80	1.90	2.05	2.15	2.25	2.40	2.50	2.60
40	1.40	1.55	1.65	1.75	1.90	2.00	2.10	2.25	2.35	2.45
42	1.25	1.40	1.50	1.60	1.75	1.85	1.95	2.10	2.20	2.30

1/ These costs apply where loading production is limited by yarding production.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Distance logs actually travel from choker setting point to the landing.
4/ For distances exceeding 1,000', add $0.15 for each additional 100' of yarding distance.

Basic data, appendix, pages 107, 256.

Yarding and Loading Selective Cut Tractor Operations

Costs in Dollars Per MBF Gross Volume Yarded and Loaded 1/

TABLE 12

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 2/ 3/									
	100	200	300	400	500	600	700	800	900	1000
4	27.20	27.80	28.45	29.05	29.65	30.25	30.90	31.50	32.10	32.75
6	25.80	26.45	27.05	27.65	28.25	28.90	29.50	30.10	30.70	31.35
8	24.45	25.05	25.70	26.30	26.90	27.50	28.15	28.75	29.35	29.95
10	23.15	23.75	24.35	24.95	25.60	26.20	26.80	27.45	28.05	28.65
12	21.85	22.45	23.05	23.70	24.30	24.90	25.55	26.15	26.75	27.35
14	20.60	21.20	21.80	22.45	23.05	23.65	24.30	24.90	25.50	26.10
16	19.40	20.00	20.60	21.20	21.85	22.45	23.05	23.65	24.30	24.90
18	18.20	18.80	19.40	20.05	20.65	21.25	21.85	22.50	23.10	23.70
20	17.05	17.65	18.25	18.90	19.50	20.10	20.70	21.35	21.95	22.55
22	15.95	16.55	17.15	17.75	18.40	19.00	19.60	20.20	20.86	21.45
24	14.85	15.45	16.05	16.70	17.30	17.90	18.55	19.15	19.75	20.35
26	13.80	14.40	15.05	15.65	16.25	16.85	17.50	18.10	18.70	19.35
28	12.80	13.40	14.00	14.65	15.25	15.85	16.45	17.10	17.70	18.30
30	11.80	12.45	13.05	13.65	14.25	14.90	15.50	16.10	16.70	17.35
32	10.85	11.50	12.10	12.70	13.35	13.95	14.55	15.15	15.80	16.40
34	9.95	10.60	11.20	11.80	12.40	13.05	13.65	14.25	14.90	15.50
36	9.10	9.70	10.30	10.95	11.55	12.15	12.80	13.40	14.00	14.60
38	8.25	8.85	9.50	10.10	10.70	11.35	11.95	12.55	13.15	13.80
40	7.45	8.05	8.70	9.30	9.90	10.50	11.15	11.75	12.35	13.00
42	6.70	7.30	7.90	8.55	9.15	9.75	10.35	11.00	11.60	12.20

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ Distance logs actually travel from choker setting point to the landing.
3/ For distances exceeding 1,000', add $0.50 for each additional 100 of yarding distance.

BASIC DATA, APPENDIX 1, PAGES 103, 104, 107, 108, 255.

Yarding and Loading - Low Ground Pressure Tractor Operations - Clearcuts

Costs in Dollars Per MBF Gross Volume Yarded and Loaded 1/

TABLE 13

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 2/ 3/									
	100	200	300	400	500	600	700	800	900	1000
8	37.90	38.50	39.15	39.75	40.35	41.00	41.60	42.20	42.85	43.45
10	31.40	32.00	32.60	33.25	33.85	34.45	35.05	35.70	36.30	36.90
12	26.05	26.65	27.30	27.90	28.50	29.15	29.75	30.35	30.95	31.60
14	21.70	22.30	22.90	23.55	24.15	24.77	25.40	26.00	26.60	27.25
16	18.15	18.75	19.35	20.00	20.60	21.20	21.85	22.45	23.05	23.70
18	15.25	15.85	16.50	17.10	17.70	18.35	18.95	19.55	20.20	20.80
20	12.90	13.50	14.15	14.75	15.35	16.00	16.60	17.20	17.80	18.45
22	11.00	11.60	12.20	12.85	13.45	14.05	14.70	15.30	15.90	16.55
24	9.45	10.05	10.65	11.30	11.90	12.50	13.10	13.75	14.35	14.95
26	8.15	8.80	9.40	10.00	10.65	11.25	11.85	12.50	13.10	13.70
28	7.15	7.75	8.40	9.00	9.60	10.25	10.85	11.45	12.10	12.70
30	6.35	6.95	7.55	8.20	8.80	9.40	10.05	10.65	11.25	11.90
35	4.95	5.55	6.15	6.80	7.40	8.00	8.65	9.25	9.85	10.50
40	4.15	4.75	5.40	6.00	6.60	7.25	7.85	8.45	9.10	9.70
45	3.75	4.35	5.00	5.60	6.20	6.85	7.45	8.05	8.70	9.30
50	3.60	4.20	4.80	5.45	6.05	6.65	7.30	7.90	8.50	9.15
55	3.55	4.20	4.80	5.40	6.05	6.65	7.25	7.90	8.50	9.10
60	3.60	4.25	4.85	5.45	6.10	6.70	7.30	7.95	8.55	9.15
65	3.75	4.35	4.95	5.60	6.20	6.80	7.45	8.05	8.65	9.25
70	3.85	4.50	5.10	5.70	6.35	6.95	7.55	8.20	8.80	9.40
75	4.05	4.65	5.25	5.90	6.50	7.10	7.70	8.35	8.95	9.55
80	4.20	4.80	5.45	6.05	6.65	7.30	7.90	8.50	9.15	9.75

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ Distance logs actually travel from choker setting point to the landing.
3/ For distances exceeding 1,000', add $0.60 for each additional 100' of yarding distance.

Basic Data, Appendix 1, Pages 103, 104 and 252.

Yarding - Low Ground Pressure Tractor Operations - Clearcuts

Costs in Dollars Per MBF Gross Volume Yarded 1/

TABLE 14

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 2/ 3/									
	100	200	300	400	500	600	700	800	900	1000
8	31.05	31.55	32.05	32.55	33.05	33.60	34.10	34.60	35.10	35.60
10	25.70	26.20	26.70	27.20	27.70	28.25	28.75	29.25	29.75	30.25
12	21.35	21.85	22.35	22.85	23.35	23.85	24.35	24.85	25.35	25.90
14	17.75	18.25	18.80	19.30	19.80	20.30	20.80	21.30	21.80	22.30
16	14.85	15.35	15.85	16.40	16.90	17.40	17.90	18.40	18.90	19.40
18	12.50	13.00	13.50	14.00	14.50	15.00	15.50	16.05	16.55	17.05
20	10.55	11.05	11.55	12.10	12.60	13.10	13.60	14.10	14.60	15.10
22	9.00	9.50	10.00	10.50	11.00	11.50	12.00	12.55	13.05	13.55
24	7.70	8.25	8.75	9.25	9.75	10.25	10.75	11.25	11.75	12.25
26	6.70	7.20	7.70	8.20	8.70	9.20	9.70	10.20	10.75	11.25
28	5.85	6.35	6.87	7.35	7.90	8.40	8.90	9.40	9.90	10.40
30	5.20	5.70	6.20	6.70	7.20	7.70	8.20	8.70	9.25	9.75
35	4.05	4.55	5.05	5.55	6.05	6.55	7.05	7.55	8.10	8.60
40	3.40	3.90	4.40	4.90	5.40	5.95	6.45	6.95	7.45	7.95
45	3.10	3.60	4.10	4.60	5.10	5.60	6.10	6.60	7.10	7.60
50	2.95	3.45	3.95	4.45	4.95	5.45	5.95	6.50	7.00	7.50
55	2.90	3.40	3.95	4.45	4.95	5.45	5.95	6.45	6.95	7.45
60	2.95	3.45	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
65	3.05	3.55	4.05	4.55	5.05	5.60	6.10	6.60	7.10	7.60
70	3.15	3.65	4.20	4.70	5.20	5.70	6.20	6.70	7.20	7.70
75	3.30	3.80	4.30	4.80	5.30	5.80	6.35	6.85	7.35	7.85
80	3.45	3.95	4.45	4.95	5.45	5.95	6.45	6.95	7.50	8.00

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ Distance logs actually travel from choker setting point to the landing.
3/ For distances exceeding 1,000', add $0.50 for each additional 100' of yarding distance.

Basic Data, Appendix 1, Pages 103, 104 and 252.

Loading - Low Ground Pressure Tractor Operations - Clearcuts

Cost in Dollars Per MBF Gross Volume Loaded 1/

TABLE 15

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 2/ 3/									
	100	200	300	400	500	600	700	800	900	1000
8	6.85	6.95	7.10	7.20	7.30	7.40	7.50	7.65	7.75	7.85
10	5.65	5.80	5.90	6.00	6.10	6.25	6.35	6.45	6.55	6.70
12	4.70	4.80	4.95	5.05	5.15	5.25	5.40	5.50	5.60	5.70
14	3.90	4.05	4.15	4.25	4.35	4.50	4.60	4.70	4.80	4.95
16	3.30	3.40	3.50	3.60	3.75	3.85	3.95	4.05	4.15	4.30
18	2.75	2.85	3.00	3.10	3.20	3.30	3.45	3.55	3.65	3.75
20	2.35	2.45	2.55	2.65	2.80	2.90	3.00	3.10	3.20	3.35
22	2.00	2.10	2.20	2.30	2.45	2.55	2.65	2.75	2.90	3.00
24	1.70	1.80	1.95	2.05	2.15	2.25	2.35	2.50	2.60	2.70
26	1.50	1.60	1.70	1.80	1.90	2.05	2.15	2.25	2.35	2.50
28	1.50	1.50	1.50	1.65	1.75	1.85	1.95	2.05	2.20	2.30
30	1.50	1.50	1.50	1.50	1.60	1.70	1.80	1.90	2.05	2.15
35	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.65	1.80	1.90
40	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.65	1.75
45	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.70
50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.65
55	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.65
60	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.65
65	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.70
75	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.70
75	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.60	1.75
80	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.55	1.65	1.75

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ Distance logs actually travel from choker setting point to the landing.
3/ For distances exceeding 1,000', add $0.10 to each additional 100' of yarding distance.

Basic Data, Appendix 1, Pages 107, 108 and 252.

Partial Cut Yarding and Loading - Low Ground Pressure Tractor Operations

Costs in Dollars Per MBF Gross Volume 1/ 2/

TABLE 16

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	54.35	55.45	56.60	57.70	58.80	59.95	61.05	62.15	63.30	64.40
10	46.60	47.70	48.85	49.95	51.10	52.20	53.30	54.45	55.55	56.05
12	40.20	41.35	42.45	43.55	44.70	45.80	46.90	48.05	49.15	50.25
14	34.90	36.05	37.15	38.25	39.40	40.50	41.65	42.75	43.85	45.00
16	30.55	31.65	32.75	33.90	35.00	36.10	37.25	38.35	39.50	40.60
18	26.90	28.00	29.15	30.25	31.35	32.50	33.60	34.70	35.85	36.95
20	23.85	24.95	26.10	27.20	28.35	29.45	30.55	31.70	32.80	33.90
22	21.30	22.45	23.55	24.65	25.80	26.90	28.00	29.15	30.25	31.35
24	19.20	20.30	21.40	22.55	23.65	24.75	25.90	27.00	28.10	29.25
26	17.10	18.50	19.60	20.75	21.85	22.95	24.10	25.20	26.30	27.45
28	15.85	16.95	18.10	19.20	20.30	21.45	22.55	23.65	24.80	25.90
30	14.75	15.70	16.60	17.90	19.00	20.15	21.25	22.35	23.50	24.60
35	12.70	13.60	14.50	15.45	16.50	17.60	18.70	19.85	20.95	22.05
40	11.20	12.10	13.00	13.95	14.85	15.75	16.90	18.00	19.10	20.25
45	10.05	10.95	11.85	12.80	13.70	14.60	15.55	16.60	17.70	18.85
50	9.10	10.00	10.95	11.85	12.75	13.70	14.60	15.50	16.40	17.35
55	8.30	9.20	10.10	11.05	11.95	12.85	13.80	14.70	15.60	16.55
60	7.55	8.50	9.40	10.30	11.15	12.15	13.05	13.95	14.90	15.80
65	6.90	7.80	8.70	9.60	10.55	11.45	12.35	13.30	14.20	15.10
70	6.20	7.15	8.05	8.95	9.90	10.00	11.70	12.65	13.55	14.45
75	5.60	6.50	7.40	8.35	9.25	10.15	11.10	12.00	12.90	13.80
80	4.95	5.90	6.80	7.70	8.60	9.55	10.45	11.35	12.30	13.20

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ The cost per MBF Gross volume from the two tables must be combined before the weighted partial cut tractor yarding cost calculation is made. Special note must be made of the algebraic sign which appears in the second table.
3/ Yarding distance is the average straight line slope distance from choker setting point to the landing. Do not add a weave.
4/ For distances exceeding 1,000', add $1.10 for each additional 100' of yarding distance.

Basic Data, Appendix 1, Pages 105-108, and 254-256.

Partial Cut Yarding and Loading - Low Ground Pressure Tractor Operations

Costs in Dollars Per MBF Gross Volume Yarded and Loaded

TABLE 17

Per Cent Slope 6/	Number of Merchantable Stems Marked Per Acre 5/												
	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-1.60	-1.90	-2.20	-2.55	-2.85	-3.15	-3.50	-3.80	-4.10	-4.45	-4.75	-5.05	-5.40	-5.70
5	-0.70	-1.00	-1.30	-1.65	-1.95	-2.30	-2.60	-2.90	-3.25	-3.55	-3.85	-4.20	-4.50	-4.80
10	0.20	-0.10	-0.45	-0.75	-1.05	-1.40	-1.70	-2.00	-2.35	-2.65	-2.95	-3.30	-3.60	-3.90
15	1.10	0.80	0.45	0.15	-0.15	-0.50	-0.80	-1.15	-1.45	-1.75	-2.10	-2.40	-2.70	-3.05
20	2.00	1.65	1.35	1.05	0.70	0.40	-0.10	-0.25	-0.55	-0.85	-1.20	-1.50	-1.80	-2.15
25	2.90	2.55	2.25	1.95	1.60	1.30	1.00	0.65	0.35	0.05	-0.30	-0.60	-0.95	-1.25
30	3.75	3.45	3.15	2.80	2.50	2.20	1.85	1.55	1.25	0.90	0.60	0.30	-0.05	-0.35
35	4.65	4.35	4.05	3.70	3.40	3.10	2.75	2.45	2.15	1.80	1.50	1.20	0.85	0.55
40	5.55	5.25	4.95	4.60	4.30	3.95	3.65	3.35	3.00	2.70	2.40	2.05	1.75	1.45
45	6.45	6.15	5.80	5.50	5.20	4.85	4.55	4.25	3.90	3.60	3.30	2.95	2.65	2.35
50	7.35	7.05	6.70	6.40	6.10	5.75	5.45	5.15	4.80	4.50	4.15	3.85	3.55	3.20
55	8.25	7.90	7.60	7.30	6.95	6.65	6.35	6.00	5.70	5.40	5.05	4.75	4.45	4.10
60	9.15	8.80	8.50	8.20	7.85	7.55	7.25	6.90	6.60	6.30	5.95	5.65	5.35	5.00

5/ Marked Stems - This is the number of merchantable stems marked per acre within the yarding area.
6/ Slope - This is the average slope in per cent of the area being logged as estimated by the cruiser.

Basic Data, Appendix 1, Pages 105-108 and 254-256.

Partial Cut Yarding - Low Ground Pressure Tractor Operations

Costs in Dollars Per MBF Gross Volume 1/ 2/

TABLE 18

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	44.50	45.45	46.35	47.25	48.20	49.10	50.00	50.95	51.85	52.75
10	38.20	39.10	40.00	40.90	41.85	42.75	43.65	44.60	45.50	46.40
12	32.95	33.85	34.75	35.70	36.60	37.50	38.45	39.35	40.25	41.20
14	28.60	29.50	30.45	31.35	32.25	33.20	34.10	35.00	35.95	36.85
16	25.00	25.95	26.85	27.75	28.70	29.60	30.50	31.40	32.35	33.25
18	22.05	22.95	23.85	24.80	25.70	26.60	27.50	28.45	29.35	30.25
20	19.55	20.45	21.35	22.30	23.20	24.10	25.05	25.95	26.85	27.80
22	17.45	18.40	19.30	20.20	21.10	22.05	22.95	23.85	24.80	25.70
24	15.70	16.65	17.55	18.45	19.35	20.30	21.20	22.10	23.05	23.95
26	14.25	15.15	16.05	17.00	17.90	18.80	19.75	20.65	21.55	22.45
28	13.00	13.90	14.80	15.75	16.65	17.55	18.50	19.40	20.30	21.20
30	11.90	12.85	13.75	14.65	15.60	16.50	17.40	18.30	19.25	20.15
35	9.85	10.75	11.65	12.60	13.50	14.40	15.35	16.25	17.15	18.05
40	8.35	9.25	10.15	11.10	12.00	12.90	13.85	14.75	15.65	16.55
45	7.20	8.10	9.00	9.95	10.85	11.75	12.70	13.60	14.50	15.40
50	6.25	7.15	8.10	9.00	9.90	10.85	11.75	12.65	13.55	14.50
55	5.45	6.35	7.25	8.20	9.10	10.00	10.95	11.85	12.75	13.70
60	4.70	5.65	6.55	7.45	8.35	9.30	10.20	11.10	12.05	12.95
65	4.05	4.95	5.85	6.75	7.70	8.60	9.50	10.45	11.35	12.25
70	3.35	4.30	5.20	6.10	7.05	7.95	8.85	9.80	10.70	11.60
75	2.75	3.65	4.55	5.50	6.40	7.30	8.25	9.15	10.05	10.95
80	2.10	3.05	3.95	4.85	5.75	6.70	7.60	8.50	9.45	10.35

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
2/ The cost per MBF Gross volume from the two tables must be combined before the weighted partial cut tractor yarding cost calculation is made. Special note must be made of the algebraic sign which appears in the second table.
3/ Yarding distance is the average straight line slope distance from choker setting point to the landing. Do not add a weave.
4/ For distances exceeding 1,000', add $0.90 for each additional 100' of yarding distance.

Basic Data, Appendix 1, Pages 105, 106 and 254-256.

Partial Cut Yarding - Low Ground Pressure Tractor Operations

Costs in Dollars Per MBF Gross Volume

TABLE 19

Per Cent 6/ Slope	Number of Merchantable Stems Marked Per Acre 5/												
	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-1.30	-1.55	-1.80	-2.10	-2.35	-2.60	-2.85	-3.10	-3.40	-3.65	-3.90	-4.15	-4.40	-4.70
5	-0.55	-0.85	-1.10	-1.35	-1.60	-1.85	-2.10	-2.40	-2.65	-2.90	-3.15	-3.40	-3.70	-3.95
10	0.15	-0.10	-0.35	-0.60	-0.85	-1.15	-1.40	-1.65	-1.90	-2.15	-2.45	-2.70	-2.95	-3.20
15	0.90	0.65	0.40	0.10	-0.15	-0.40	-0.65	-0.90	-1.20	-1.45	-1.70	-1.95	-2.20	-2.50
20	1.65	1.35	1.10	0.85	0.60	0.35	0.05	-0.20	-0.45	-0.70	-0.95	-1.25	-1.50	-1.75
25	2.35	2.10	1.85	1.60	1.30	1.05	0.80	0.55	0.30	0.00	-0.25	-0.50	-0.75	-1.00
30	3.10	2.85	2.55	2.30	2.05	1.80	1.55	1.25	1.00	0.75	0.50	0.25	-0.05	-0.30
35	3.80	3.55	3.30	3.05	2.80	2.50	2.25	2.00	1.75	1.50	1.20	0.95	0.70	0.45
40	4.55	4.30	4.05	3.80	3.50	3.25	3.00	2.75	2.50	2.20	1.95	1.70	1.45	1.20
45	5.30	5.05	4.75	4.50	4.25	4.00	3.75	3.45	3.20	2.95	2.70	2.45	2.15	1.90
50	6.00	5.75	5.50	5.25	5.00	4.70	4.45	4.20	3.95	3.70	3.40	3.15	2.90	2.65
55	6.75	6.50	6.25	5.95	5.70	5.45	5.20	4.95	4.65	4.40	4.15	3.90	3.65	3.35
60	7.50	7.20	6.95	6.70	6.45	6.20	5.90	5.65	5.40	5.15	4.90	4.60	4.35	4.10

5/ Marked Stems - This is the number of merchantable stems marked per acre within the yarding area.
6/ Slope - This is the average slope in per cent of the area being logged as estimated by the cruiser.

Basic Data, Appendix 1, Pages 105, 106 and 254-256.

Partial Cut Loading - Low Ground Pressure Tractor Operations

Costs in Dollars Per MBF Gross Volume Loaded 1/ 2/

TABLE 20

Yarding Distance in Feet 3/ 4/

16 Ft. Log Volume Scrib. Dec.C.	100	200	300	400	500	600	700	800	900	1000
8	9.85	10.05	10.25	10.45	10.65	10.85	11.05	11.25	11.45	11.65
10	8.45	8.65	8.85	9.05	9.25	9.45	9.65	9.85	10.05	10.25
12	7.25	7.45	7.70	7.90	8.10	8.30	8.50	8.70	8.90	9.10
14	6.30	6.50	6.70	6.90	7.10	7.30	7.55	7.75	7.95	8.15
16	5.50	5.70	5.95	6.15	6.35	6.55	6.75	6.95	7.15	7.35
18	4.85	5.05	5.25	5.45	5.65	5.85	6.10	6.30	6.50	6.70
20	4.30	4.50	4.70	4.90	5.10	5.30	5.55	5.75	5.95	6.15
22	3.85	4.06	4.26	4.45	4.65	4.85	5.05	5.25	5.45	5.65
24	3.45	3.65	3.85	4.05	4.30	4.50	4.70	4.90	5.10	5.30
26	3.15	3.35	3.55	3.75	3.95	4.15	4.35	4.55	4.75	4.95
28	2.85	3.05	3.25	3.45	3.65	3.90	4.10	4.30	4.50	4.70
30	2.85	2.85	3.05	3.25	3.45	3.65	3.85	4.05	4.25	4.45
35	2.85	2.85	2.85	2.85	3.00	3.20	3.40	3.60	3.80	4.00
40	2.85	2.85	2.85	2.85	2.85	2.85	3.05	3.25	3.45	3.65
45	2.85	2.85	2.85	2.85	2.85	2.85	2.85	3.00	3.20	3.40
50	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	3.00	3.20
55	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	3.00
60	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
65	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
70	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
75	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
80	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.

2/ The cost per MBF Gross volume from the two tables must be combined before the weighted partial cut tractor yarding cost calculation is made. Special note must be made of the algebraic sign which appears in the second table.

3/ Yarding distance is the average straight line slope distance from choker setting point to the landing. Do not add a weave.

4/ For distances exceeding 1,000', add $0.20 for each additional 100' of yarding distance.

Basic Data, Appendix 1, Pages 107, 108, 254 and 255.

Partial Cut Loading - Low Ground Pressure Tractor Operations

Costs in Dollars Per MBF Gross Volume Loaded

TABLE 21

Per Cent 6/ Slope	Number of Merchantable Stems Marked Per Acre 5/												
	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-0.30	-0.35	-0.40	-0.45	-0.50	-0.55	-0.65	-0.70	-0.75	-0.80	-0.85	-0.90	-0.95	-1.05
5	-0.10	-0.20	-0.25	-0.30	-0.35	-0.40	-0.45	-0.55	-0.60	-0.65	-0.70	-0.75	-0.80	-0.85
10	-0.05	0.00	-0.10	-0.15	-0.20	-0.25	-0.30	-0.35	-0.40	-0.50	-0.55	-0.60	-0.65	-0.70
15	0.20	0.15	0.10	0.05	-0.05	-0.10	-0.15	-0.20	-0.25	-0.30	-0.40	-0.45	-0.50	-0.55
20	0.35	0.30	0.25	0.20	0.15	0.05	0.00	-0.05	-0.10	-0.15	-0.20	-0.25	-0.35	-0.40
25	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.10	0.05	0.00	-0.05	-0.10	-0.15	-0.20
30	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.20	0.15	0.10	0.05	0.00	-0.05
35	0.85	0.80	0.75	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.25	0.20	0.15	0.10
40	1.00	0.95	0.90	0.85	0.80	0.70	0.65	0.60	0.55	0.50	0.45	0.35	0.30	0.25
45	1.15	1.10	1.05	1.00	0.95	0.90	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.40
50	1.35	1.25	1.20	1.15	1.10	1.05	1.00	0.95	0.85	0.80	0.75	0.70	0.65	0.60
55	1.50	1.45	1.40	1.30	1.25	1.20	1.15	1.10	1.05	0.95	0.90	0.85	0.80	0.75
60	1.65	1.60	1.55	1.50	1.40	1.35	1.30	1.25	1.20	1.15	1.10	1.00	0.95	0.90

5/ Marked Stems - This is the number of merchantable stems marked per acre within the yarding area.
6/ Slope - This is the average slope in per cent of the area being logged as estimated by the cruiser.

Basic Data, Appendix 1, Pages 107, 108, 254 and 255.

Clearcut Yarding and Loading - High-Lead Operations

Costs In Dollars Per MBF Gross Volume Yarded and Loaded 1/ 2/

TABLE 22

16 Ft. Log Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	56.35	58.25	60.20	62.15	64.05	66.00	67.90	69.85	71.75	73.70
10	42.20	44.10	46.05	47.95	49.90	51.85	53.75	55.70	57.60	59.55
12	32.70	34.60	36.55	38.45	40.40	42.35	44.25	46.20	48.10	50.05
14	26.30	28.25	30.15	32.10	34.00	35.95	37.90	39.80	41.75	43.65
16	22.05	23.95	25.90	27.80	29.75	31.65	33.60	35.50	37.45	39.40
18	19.15	21.05	23.00	24.95	26.85	28.80	30.70	32.65	34.55	36.50
20	17.20	19.15	21.05	23.00	24.90	26.85	28.75	30.70	32.65	34.55
22	15.90	17.85	19.75	21.70	23.60	25.55	27.45	29.40	31.30	33.25
24	15.00	16.95	18.85	20.80	22.70	24.65	26.55	28.50	30.45	32.35
26	14.40	16.35	18.25	20.20	22.10	24.05	25.95	27.90	29.80	31.75
28	14.00	15.90	17.85	19.75	21.70	23.60	25.55	27.50	29.40	31.35
30	13.70	15.65	17.55	19.50	21.40	23.35	25.25	27.20	29.10	31.05
35	13.30	15.20	17.15	19.00	21.00	22.95	24.85	26.80	28.70	30.65
40	13.10	15.05	16.95	18.90	20.80	22.75	24.65	26.60	28.50	30.45
45	13.00	14.90	16.85	18.75	20.70	22.60	24.55	26.45	28.40	30.30
50	12.90	14.80	16.75	18.65	20.60	22.50	24.45	26.35	28.30	30.25
55	12.80	14.75	16.65	18.60	20.50	22.45	24.35	26.30	28.20	30.15
60	12.75	14.65	16.60	18.50	20.45	22.35	24.30	26.20	28.15	30.10
65	12.65	14.60	16.50	18.45	20.35	22.30	24.20	26.15	28.05	30.00
70	12.60	14.50	16.45	18.35	20.30	22.20	24.15	26.05	28.00	29.95
75	12.50	14.45	16.35	18.30	20.20	22.15	24.05	26.00	27.95	29.85
80	12.45	14.35	16.30	18.20	20.15	22.05	24.00	25.90	27.85	29.80

1/ If volume of average log does not fall on volumes listed, use cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.

3/ Correction for slope - uphill yarding - subtract $0.42 for each 10 per cent of slope from 0 per cent to 60 per cent. Use the value for 60 per cent for slopes exceeding 60 per cent. Downhill yarding - add $0.42 for each 10 per cent of slope from 0 to 30 per cent. Use the value for 30 per cent for slopes exceeding 30 per cent.
4/ For distances exceeding 1,000', add $1.90 for each additional 100' of yarding distance.

Basic Data, appendix 1, pages 121, 122, 127, 128 and 257.

Clear-cut High-Lead Yarding

Costs in Dollars Per MBF Gross Volume Yarded 1/ 2/

TABLE 23

16 Ft. Log Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	44.95	46.50	48.05	49.55	51.10	52.65	54.20	55.70	57.25	58.80
10	33.65	35.20	37.75	38.25	39.80	41.35	42.90	44.40	45.95	47.50
12	26.10	27.60	29.15	30.70	32.25	33.75	35.30	36.85	38.40	39.90
14	21.00	22.55	24.05	25.60	27.15	28.70	30.20	31.75	33.30	34.85
16	17.60	19.10	20.65	22.20	23.75	25.25	26.80	28.35	29.90	31.40
18	15.30	16.80	18.35	19.90	21.45	22.95	24.50	26.05	27.60	29.10
20	13.75	15.25	16.80	18.35	19.90	21.40	22.95	24.50	26.05	27.55
22	12.70	14.20	15.75	17.30	18.85	20.35	21.90	23.45	25.00	26.50
24	12.00	13.50	15.05	16.60	18.10	19.65	21.20	22.75	24.25	25.80
26	11.50	13.05	14.55	16.10	17.65	19.20	20.70	22.25	23.80	25.35
28	11.15	12.70	14.25	15.75	17.30	18.85	20.40	21.90	23.45	25.00
30	10.95	12.45	14.00	15.55	17.10	18.60	20.15	21.70	23.25	24.75
35	10.60	12.15	13.70	15.20	16.75	18.30	19.65	21.20	22.75	24.30
40	10.45	12.00	13.50	15.05	16.60	18.15	19.65	21.20	22.75	24.30
45	10.35	11.90	13.45	14.95	16.50	18.05	19.60	21.10	22.65	24.20
50	10.30	11.80	13.35	14.90	16.45	17.95	19.50	21.05	22.60	24.10
55	10.20	11.75	13.30	14.85	16.35	17.90	19.45	21.00	22.50	24.05
60	10.15	11.70	13.25	14.75	16.30	17.85	19.40	20.90	22.45	24.00
65	10.10	11.65	13.15	14.70	16.25	17.80	19.30	20.85	22.40	23.95
70	10.05	11.60	13.10	14.65	16.20	17.75	19.25	20.80	22.35	23.85
75	10.00	11.50	13.05	14.60	16.15	17.65	19.20	20.75	22.30	23.80
80	9.90	11.45	13.00	14.55	16.05	17.60	19.15	20.70	22.20	23.75

1/ If volume of average log does not fall on volumes listed, use cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Correction for slope - uphill yarding - subtract $0.31 for each 10 per cent of slope from 0 per cent to 60 per cent. Use the value for 60 per cent for slopes exceeding 60 per cent. Downhill yarding - add $0.31 for each 10 per cent of slope from 0 to 30 per cent. Use the value for 30 per cent for slopes exceeding 30 per cent.
4/ For distances exceeding 1,000', add $1.55 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 121, 122 and 257.

Clearcut Loading - High-Lead Operations

Costs in Dollars Per MBF Gross Volume Loaded 1/ 2/ 3/

TABLE 24

16 Ft. Log Volume Scrib. Dec.C	Yarding (Slope) Distance in Feet 4/ 5/									
	100	200	300	400	500	600	700	800	900	1000
8	11.40	11.80	12.15	12.55	12.95	13.35	13.75	14.10	14.50	14.90
10	8.55	8.90	9.30	9.70	10.10	10.50	10.85	11.25	11.65	12.05
12	6.60	7.00	7.40	7.80	8.15	8.55	8.95	9.35	9.75	10.10
14	5.30	5.70	6.10	6.50	6.90	7.25	7.65	8.05	8.45	8.85
16	4.45	4.85	5.25	5.60	6.00	6.40	6.80	7.20	7.55	7.95
18	3.85	4.25	4.65	5.05	5.45	5.80	6.20	6.60	7.00	7.40
20	3.50	3.85	4.25	4.65	5.05	5.45	5.80	6.20	6.60	7.00
22	3.20	3.60	4.00	4.40	4.75	5.15	5.55	5.95	6.35	6.70
24	3.05	3.45	3.80	4.20	4.60	5.00	5.35	5.75	6.15	6.55
26	2.90	3.30	3.70	4.10	4.45	4.85	5.25	5.65	6.05	6.40
28	2.85	3.20	3.60	4.00	4.40	4.80	5.15	5.55	5.95	6.35
30	2.75	3.15	3.55	3.95	4.30	4.70	4.10	5.50	4.90	6.30
35	2.70	3.10	3.45	3.85	4.25	4.65	5.05	5.40	5.80	6.20
40	2.65	3.05	3.45	3.80	4.20	4.60	5.00	5.40	5.75	6.15
45	2.60	3.00	3.40	3.80	4.20	4.55	4.95	5.35	5.75	6.15
50	2.60	3.00	3.40	3.80	4.15	4.55	4.95	5.35	5.70	6.10
55	2.60	3.00	3.35	3.75	4.15	4.55	4.95	5.30	5.70	6.10
60	2.55	2.95	3.35	3.75	4.15	4.50	4.90	5.30	5.70	6.10
65	2.55	2.95	3.35	3.75	4.10	4.50	4.90	5.30	5.70	6.05
70	2.55	2.95	3.30	3.70	4.10	4.50	4.90	5.25	5.65	6.05
75	2.55	2.90	3.30	3.70	4.10	4.50	4.85	5.25	5.65	6.05
80	2.50	2.90	3.30	3.70	4.05	4.45	4.85	5.25	5.65	6.00

1/ These costs apply where loading production is limited by yarding production.
2/ If volume of average log does not fall on volumes listed, use cost of the next lower log volume.
3/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
4/ Correction for slope - uphill yarding - subtract $0.10 for each 10 per cent of slope from 0 per cent to 60 per cent. Use the value for 60 per cent for slopes exceeding 60 per cent. Downhill yarding - add $0.10 for each 10 per cent of slope from 0 to 30 per cent. Use the value for 30 per cent for slopes exceeding 30 per cent.
5/ For distances exceeding 1,000', add $0.60 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 127, 128 and 257.

Illustration 2
(.33E)

9353.3 - PRODUCTION COSTS

(Schedule 4)

RIGGING, YARDING AND LOADING

TABLE 25

HIGH LEAD RIGGING

Includes: Yarder and tower
Large mobile log loader
Tractor w/dozer (yarding tractor)
6 man yarding crew
2 man loading crew
2 man landing construction crew (part time)

Medium Yarder (Washington 78A)

First Pole	$1195
1/ Additional Poles	$ 560 (each)
Portable Tower - 90' Tower	
First Pole	$1115
1/ Additional Poles	$ 570 (each)
Portable Tower - 110' Tower	
First Pole	$1270
1/ Additional Poles	$ 575 (each)

1/ Poles within 1/2 mile of previous pole.

Move in costs not included. See Table 1 for appropriate move in costs. These rigging costs are suggested as guidelines. The appraiser should judge each logging situation individually and develop appropriate rigging costs.

Basic Data, Appendix 1, Pages 129-136.

Illustration 2
(.22 E2)

Clearcut Portable Tower Yarding and Loading - 90' - Crawler Mounted Tower

Costs in Dollars Per MBF Gross Volume Yarded and Loaded 1/ 2/

TABLE 26

16 Ft. Log Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	57.80	59.75	61.75	63.70	65.70	67.65	69.65	71.60	73.60	75.55
10	43.25	45.25	47.20	49.20	51.15	53.15	55.15	57.10	59.10	61.05
12	33.55	35.50	37.50	39.45	41.45	43.40	45.40	47.35	49.35	51.30
14	27.00	28.95	30.95	32.90	34.90	36.85	38.85	40.80	42.80	44.80
16	22.60	24.55	26.55	28.55	30.50	32.50	34.45	36.45	38.40	40.40
18	19.65	21.60	23.60	25.55	27.55	29.50	31.50	33.45	35.45	37.45
20	17.65	19.65	21.60	23.60	25.55	27.55	29.50	31.50	33.45	35.45
22	16.30	18.30	20.25	22.25	24.20	26.20	28.15	30.15	32.10	34.10
24	15.40	17.35	19.35	21.30	23.30	25.30	27.25	29.25	31.20	33.20
26	14.75	16.75	18.75	20.70	22.70	24.65	26.65	28.60	30.60	32.55
28	14.35	16.30	18.30	20.30	22.25	24.25	26.20	28.20	30.15	32.15
30	14.05	16.05	18.00	20.00	21.95	23.95	25.90	27.90	29.85	31.85
35	13.65	15.60	17.60	19.55	21.55	23.50	25.50	27.45	29.45	31.40
40	13.45	15.40	17.40	19.35	21.35	23.30	25.30	27.25	29.25	31.20
45	13.30	15.30	17.25	19.25	21.20	23.20	25.15	27.15	29.10	31.10
50	13.20	15.20	17.15	19.15	21.10	23.10	25.10	27.05	29.05	31.00
55	13.15	15.10	17.10	19.05	21.05	23.00	25.00	26.95	28.95	30.90
60	13.05	15.05	17.00	19.00	20.95	22.95	24.90	26.90	28.85	30.85
65	13.00	14.95	16.95	18.90	20.90	22.85	24.85	26.80	28.80	30.75
70	12.90	14.90	16.85	18.85	20.80	22.80	24.75	26.75	28.70	30.70
75	12.85	14.80	16.80	18.75	20.75	22.70	24.70	26.65	28.65	30.60
80	12.75	14.75	16.70	18.70	20.65	22.65	24.60	26.60	28.55	30.55

1/ If volume of average log does not fall on volumes listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Correction for slope - uphill yarding - subtract $0.41 for each 10 per cent of slope from 0 to 60 per cent. Use the value for 60 per cent for slopes exceeding 60 per cent. Downhill yarding - add $0.41 for each 10 per cent of slope from 0 to 30 per cent. Use the value for 30 per cent for slopes exceeding 30 per cent.
4/ For distances exceeding 1,000', add $1.95 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 123, 124, 127, 128 and 257.

Clearcut Portable Tower Yarding - 90' Crawler Mounted Tower

Costs in Dollars Per MBF Gross Volume Yarded 1/ 2/

TABLE 27

16 Ft. Log Volume Scrib. Dec.C	Yarding (Slope) Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	46.40	48.00	49.55	51.15	52.75	54.30	55.90	57.50	59.10	60.05
10	34.75	36.30	37.90	39.50	41.10	42.65	44.25	45.85	47.45	49.00
12	26.90	28.50	30.10	31.70	33.25	34.85	36.45	38.00	39.60	41.20
14	21.65	23.25	24.85	26.45	28.00	29.60	31.20	32.75	34.35	35.95
16	18.15	19.75	21.30	22.90	24.50	26.05	27.65	29.25	30.85	32.40
18	15.75	17.35	18.95	20.55	22.10	23.70	25.30	26.85	28.45	30.05
20	14.15	15.75	17.35	18.95	20.50	22.10	23.70	25.30	26.85	28.45
22	13.10	14.70	16.25	17.85	19.45	21.00	22.60	24.20	25.80	27.35
24	12.35	13.95	15.55	17.10	18.70	20.30	21.90	23.45	25.05	26.65
26	11.85	13.45	15.05	16.60	18.20	19.80	21.40	22.95	24.55	26.15
28	11.50	13.10	14.70	16.30	17.85	19.45	21.05	22.60	24.20	25.80
30	11.30	12.85	14.45	16.05	17.65	19.20	20.80	22.40	23.95	25.55
35	10.95	12.55	14.10	15.70	17.30	18.90	20.45	22.05	23.65	25.25
40	10.80	12.35	13.95	15.55	17.15	18.70	20.30	21.90	23.50	25.05
45	10.70	12.25	13.85	15.45	17.05	18.60	20.20	21.80	23.40	24.95
50	10.60	12.20	13.80	15.35	16.95	18.55	20.15	21.70	23.30	24.90
55	10.55	12.15	13.70	15.30	16.90	18.50	20.05	21.65	23.25	24.85
60	10.50	12.05	13.65	15.25	16.85	18.40	20.00	21.60	23.20	24.75
65	10.40	12.00	13.60	15.20	16.75	18.35	19.95	21.55	23.10	24.70
70	10.35	11.95	13.55	15.10	16.70	18.30	19.90	21.45	23.05	24.65
75	10.30	11.90	13.45	15.05	16.65	18.25	19.80	21.40	23.00	24.60
80	10.25	11.85	13.40	15.00	16.60	18.15	19.75	21.35	22.95	24.50

1/ If volume of average log does not fall on volumes listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Correction for slope - uphill yarding - subtract $0.35 for each 10 per cent of slope from 0 to 60 per cent. Use the value for 60 per cent for slopes exceeding 60 per cent. Downhill yarding - add $0.35 for each 10 per cent of slope from 0 to 30 per cent. Use the value for 30 per cent for slopes exceeding 30 per cent.
4/ For distances exceeding 1,000', add $1.60 for each additional 100' of yarding distance.

Baxic data, appendix 1, pages 129, 133.

Clearcut Portable Tower Yarding and Loading - 110' Trailer Mounted Tower

Costs in Dollars Per MBF Cross Volume Yarded and Loaded 1/ 2/

TABLE 28

16 Ft. Log Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	68.35	70.70	73.05	75.40	77.70	80.05	82.40	84.75	87.05	89.40
10	51.20	53.55	55.85	58.20	60.55	62.90	65.20	67.55	69.90	72.25
12	39.65	42.00	44.35	46.70	49.00	51.35	53.70	56.05	58.35	60.70
14	31.95	34.25	36.60	38.95	41.30	43.60	45.95	48.30	50.65	52.95
16	26.75	29.05	31.40	33.75	36.10	38.40	40.75	43.10	45.45	47.75
18	23.25	25.55	27.90	30.25	32.60	35.95	37.25	39.60	41.95	44.30
20	20.90	23.20	25.55	27.90	30.25	32.55	34.90	37.25	39.60	41.90
22	19.30	21.65	23.95	26.30	28.65	31.00	33.30	35.65	38.00	40.35
24	18.20	20.55	22.90	25.25	27.55	29.90	32.25	34.60	36.90	39.25
26	17.50	19.80	22.15	24.50	26.85	29.15	31.50	33.85	36.20	38.50
28	16.95	19.30	21.65	24.00	26.35	28.65	31.00	33.35	35.70	38.00
30	16.60	18.95	21.30	23.65	26.00	28.30	30.05	33.00	35.35	37.65
35	16.15	18.45	20.80	23.15	25.50	27.80	30.15	32.50	34.85	37.15
40	15.90	18.25	20.55	22.90	25.25	27.60	29.90	32.25	34.60	36.95
45	15.75	18.10	20.40	22.75	25.10	27.45	29.80	32.10	34.45	36.80
50	15.65	18.00	20.30	22.65	25.00	27.35	29.65	32.00	34.35	36.70
55	15.55	17.90	20.20	22.55	24.90	27.25	29.55	31.90	34.25	36.60
60	15.45	17.80	20.10	22.45	24.80	27.15	29.50	31.80	34.15	36.50
65	15.35	17.70	20.05	22.35	24.70	27.05	29.40	31.70	34.05	36.40
70	15.25	17.60	19.95	22.30	24.60	26.95	29.30	31.65	33.95	36.30
75	15.20	17.50	19.85	22.20	24.55	26.85	29.20	31.55	33.90	36.20
80	15.10	17.45	19.75	22.10	24.45	26.80	29.10	31.45	33.80	36.15

1/ If volume of average log does not fall on volumes listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Correction for slope - uphill yarding - subtract $0.58 for each 10 per cent of slope from 0 to 60 per cent. Use the value for 60 per cent for slopes exceeding 60 per cent. Downhill yarding - add $0.58 for each 10 per cent of slope from 0 to 30 per cent. Use the value for 30 per cent for slopes exceeding 30 per cent.
4/ For distances exceeding 1,000', add $2.30 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 125-128 and 257.

Clearcut Portable Tower Yarding - 110' Trailer Mounted Tower

Costs in Dollars Per MBF Gross Volume Yarded 1/ 2/

TABLE 29

16 Ft. Log Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	58.15	60.15	62.15	64.15	66.15	68.10	70.10	72.10	74.10	76.10
10	43.55	45.55	47.55	49.55	51.50	53.50	55.50	57.50	59.45	61.45
12	33.75	35.75	37.75	39.70	41.70	43.70	45.70	47.70	49.65	51.65
14	27.15	29.15	31.15	33.15	35.15	37.10	39.10	41.10	43.10	45.10
16	22.75	24.75	26.75	28.70	30.70	32.70	34.70	36.65	38.65	40.65
18	19.75	21.75	23.75	25.75	27.75	29.70	31.70	33.70	35.70	37.70
20	17.75	19.75	21.75	23.75	25.75	27.70	29.70	31.70	33.70	35.65
22	16.40	18.40	20.40	22.40	24.35	26.35	28.35	30.35	32.35	34.30
24	15.50	17.50	19.45	21.45	23.45	25.45	27.45	29.40	31.40	33.40
26	14.85	16.85	18.85	20.85	22.85	24.80	26.80	28.80	30.80	32.80
28	14.45	16.45	18.40	20.40	22.40	24.40	26.40	28.35	30.35	32.35
30	14.15	16.15	18.15	20.10	22.10	24.10	26.10	28.05	30.05	32.05
35	13.75	15.70	17.70	19.70	21.70	23.65	25.65	27.65	29.65	31.65
40	13.50	15.50	17.50	19.50	21.50	23.45	25.45	27.45	29.45	31.45
45	13.40	15.40	17.40	19.35	21.35	23.35	25.35	27.35	29.30	31.30
50	13.30	15.30	17.30	19.30	21.25	23.25	25.25	27.25	29.20	31.20
55	13.25	15.20	17.20	19.20	21.20	23.15	25.15	27.15	29.15	31.15
60	13.15	15.15	17.15	19.10	21.10	23.10	25.10	27.05	29.05	31.05
65	13.05	15.05	17.05	19.05	21.05	23.00	25.00	27.00	29.00	30.95
70	13.00	15.00	16.95	18.95	20.95	22.95	24.95	26.95	28.90	30.90
75	12.90	14.90	16.90	18.90	20.85	22.85	24.85	26.85	28.85	30.80
80	12.85	14.85	16.80	18.80	20.80	22.80	24.80	26.75	28.75	30.75

1/ If volume of average log does not fall on volumes listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Correction for slope - uphill yarding - subtract $0.37 for each 10 per cent of slope from 0 to 60 per cent. Use the value for 60 per cent for slopes exceeding 60 per cent. Downhill yarding - add $0.37 for each 10 per cent of slope from 0 to 30 per cent. Use the value for 30 per cent for slopes exceeding 30 per cent.
4/ For distances exceeding 1,000', add $1.95 for each additional 100' of yarding distance.

Basic data, appendix, 1, pages 125, 126 and 257.

9353.3 - PRODUCTION COSTS

(Schedule 4)

RIGGING, YARDING AND LOADING

TABLE 30

STATIC SKYLINE RIGGING

110' Portable Tower

Includes: Tower and yarder, single drum sky car and associated rigging.

Large mobile log loader
Tractor 2/dozer (yarding tractor)
8-man yarding and loading crew
Tractor operator to assist in landing construction and rig up.

First and each other additional pole	$4080 (each)

Tail Hold

First Tail Hold	$1590
Additional Tail Holds	$1350

Move in costs not included. See Table 1 for appropriate move in costs. These rigging costs are suggested as guidelines. In order to develop appropriate rigging costs, the appraiser must have an understanding of basic skyline engineering, layout and design. He must be able to predict the location and number of skyline roads, tower or rigged tree setups, and tail holds.

Basic Data, Appendix 1, Pages 145 thru 150.

Static Skyline Yarding and Loading-Portable Tower in Clear Cuts

Costs in Dollars Per MBF Gross Volume Yarded and Loaded 1/ 2/ 3/

TABLE 31

16 Ft. Log Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet													
	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
10	42.85	43.45	44.20	45.05	46.00	47.10	48.25	49.55	51.00	52.50	54.15	55.90	57.80	59.75
12	33.30	33.95	34.70	35.55	36.50	37.55	38.75	40.05	41.45	43.00	44.65	46.40	48.25	50.25
14	26.95	27.55	28.30	29.15	30.10	31.20	32.40	33.70	35.10	36.65	38.25	40.05	41.90	43.90
16	22.65	23.30	24.00	24.85	25.85	26.90	28.10	29.40	30.80	32.35	34.00	35.75	37.65	39.60
18	19.80	20.40	21.15	22.00	22.95	24.05	25.25	26.55	27.95	29.50	31.15	32.90	34.75	36.75
20	17.90	18.50	19.25	20.10	21.05	22.15	23.30	24.60	26.05	27.55	29.20	30.95	32.85	34.80
22	16.60	17.20	17.95	18.80	19.75	20.85	22.05	23.35	24.75	26.30	27.90	29.70	31.55	33.55
24	15.75	16.35	17.10	17.95	18.90	20.00	21.15	22.45	23.90	25.40	27.05	28.80	30.70	32.65
26	15.15	15.75	16.50	17.35	18.30	19.40	20.60	21.90	23.30	24.85	26.50	28.25	30.10	32.10
28	14.75	15.40	16.10	16.95	17.95	19.00	20.20	21.50	22.90	24.45	26.10	27.85	29.70	31.70
30	14.75	15.10	15.85	16.70	17.65	18.75	19.95	21.25	22.65	24.20	25.85	27.60	29.45	31.45
32	14.75	14.95	15.70	16.55	17.50	18.55	19.75	21.05	22.50	24.00	25.65	27.40	29.30	31.25
34	14.75	14.85	15.55	16.40	17.40	18.45	19.65	20.95	22.35	23.90	25.55	27.30	29.15	31.15
36	14.75	14.75	15.50	16.35	17.30	18.40	19.55	20.85	22.30	23.80	25.45	27.20	29.10	31.05
38	14.75	14.70	15.45	16.30	17.25	18.35	19.50	20.80	22.25	23.75	25.40	27.15	29.05	31.00
40	14.75	14.70	15.45	16.25	17.20	18.30	19.50	20.80	22.20	23.75	25.35	27.15	29.00	31.00
45	14.75	14.70	15.45	16.20	17.15	18.25	19.45	20.75	22.15	23.70	25.35	27.15	29.00	30.95
50	14.75	14.70	15.45	16.20	17.15	18.25	19.40	20.70	22.15	23.70	25.35	27.15	29.00	30.95
55	14.75	14.70	15.45	16.20	17.15	18.25	19.40	20.70	22.15	23.70	25.35	27.15	29.00	30.95
60	14.75	14.70	15.45	16.20	17.15	18.25	19.40	20.70	22.15	23.70	25.35	27.15	29.00	30.95
65	14.75	14.70	15.45	16.20	17.15	18.25	19.40	20.70	22.15	23.70	25.35	27.15	29.00	30.95
70	14.75	14.70	15.45	16.20	17.15	18.25	19.40	20.70	22.15	23.70	25.35	27.15	29.00	30.95
75	14.75	14.70	15.45	16.20	17.15	18.25	19.40	20.70	22.15	23.70	25.35	27.15	29.00	30.95
80	14.75	14.70	15.45	16.20	17.15	18.25	19.40	20.70	22.15	23.70	25.35	27.15	29.00	30.95
85	14.75	14.70	15.45	16.20	17.15	18.25	19.40	20.70	22.15	23.70	25.35	27.15	29.00	30.95

1/ If average log volume does not fall on volume listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Yarding Equipment: Yarder, single drum, portable tower, radio-controlled skycar.

Static Skyline Yarding and Loading - Portable Tower In Clear Cuts

Costs in Dollars Per MBF Gross Volume Yarded and Loaded 1/ 2/ 3/

TABLE 31 (Cont'd)

16 Ft. Log Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet 4/													
	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200
10	61.85	64.10	66.40	68.85	71.40	74.05	76.80	79.70	82.70	85.85	89.05	92.40	95.85	99.45
12	52.35	54.55	56.90	59.30	61.85	64.55	67.30	70.20	73.20	76.32	79.55	82.90	86.35	89.90
14	45.95	48.20	50.50	52.95	55.50	58.15	60.95	63.80	66.80	69.95	73.15	76.50	79.95	83.55
16	41.70	43.90	46.25	48.65	51.20	53.90	56.65	59.55	62.55	65.65	68.90	72.25	75.70	79.25
18	38.85	41.05	43.35	45.80	48.35	51.00	53.80	56.70	59.70	62.80	66.05	69.35	72.85	76.40
20	36.90	39.10	41.45	43.90	46.45	49.10	51.85	54.75	57.75	60.90	64.10	67.45	70.90	74.50
22	35.65	37.85	40.15	42.60	45.15	47.80	50.60	53.45	56.45	59.60	62.80	66.15	69.60	73.20
24	34.75	36.95	39.30	41.75	44.30	46.95	49.70	52.60	55.60	58.75	61.95	65.30	68.75	72.30
26	34.20	36.40	38.70	41.15	43.70	46.35	49.15	52.05	55.05	58.15	61.40	64.70	68.20	71.75
28	33.80	36.00	38 35	40.75	43.30	46.00	48.75	51.65	54.65	57.75	61.00	64.35	67.80	71.35
30	33.55	35.75	38.05	40.50	43.05	45.70	48.50	51.40	54.40	57.50	60.75	64.05	67.55	71.10
32	33.35	35.55	37.90	40.35	42.90	45.55	48.30	51.20	54.20	57.35	60.55	63.90	67.35	70.90
34	33.25	35.45	37.80	40.20	42.75	45.45	48.20	51.10	54.10	57.20	60.45	63.80	67.25	70.80
36	33.15	35.40	37.70	40.15	42.70	45.35	48.10	51.00	54.00	57.15	60.35	63.70	67.15	70.75
38	33.10	35.30	37.65	40.10	42.65	45.30	48.05	50.95	53.95	57.10	60.30	63.65	67.10	70.70
40	33.10	35.30	37.60	40.05	42.60	45.25	48.05	50.95	53.95	57.05	60.25	63.60	67.05	70.65
45	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60
50	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60
55	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60
60	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60
65	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60
70	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60
75	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60
80	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60
85	33.05	35.25	37.55	40.00	42.55	45.20	48.00	50.90	53.90	57.00	60.25	63.55	67.05	70.60

1/ If average log volume does not fall on volume listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Yarding equipment, yarder, single drum, portable tower, radio-controlled skycar.
4/ Add $3.45 for each additional 100 ft. beyond 3200 ft.

Basic data, appendix 1, pages 141-144 and 259.

Static Skyline Yarding-Portable Tower in Clear Cuts

Costs in Dollars Per MBF Gross Volume Yarded 1/ 2/ 3/

TABLE 32

16 Ft. Log Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet													
	500	600	700	800	900	100	1100	1200	1300	1400	1500	1600	1700	1800
10	37.90	38.45	35.10	39.85	40.70	41.65	42.70	43.85	45.10	46.45	47.90	49.45	51.10	52.85
12	29.45	30.00	30.65	31.40	32.30	33.25	35.30	35.45	36.70	38.05	39.50	41.05	42.70	44.45
14	23.85	24.40	25.05	25.80	26.65	27.60	28.65	29.80	31.05	32.40	33.85	35.40	37.05	38.80
16	20.05	20.60	21.25	22.00	22.85	23.80	24.85	26.00	27.25	28.60	30.05	31.60	33.30	35.05
18	17.50	18.05	18.70	19.45	20.30	21.25	22.30	23.50	24.75	26.10	27.55	29.10	30.75	32.50
20	15.80	16.35	17.00	17.75	18.60	19.55	20.60	21.80	23.05	24.40	25.85	27.40	29.05	30.80
22	14.65	15.25	15.90	16.65	17.50	18.45	19.50	20.65	21.90	23.25	24.70	26.25	27.90	29.65
24	13.90	14.45	15.10	15.85	16.70	17.65	18.70	19.85	21.15	22.50	23.95	25.50	27.15	28.90
26	13.40	13.95	14.60	15.35	16.20	17.15	18.20	19.35	20.60	21.95	23.40	24.95	26.65	28.40
28	13.05	13.60	14.25	15.00	15.85	16.80	17.85	19.00	20.25	21.65	23.10	24.65	26.30	28.05
30	13.05	13.40	14.00	14.80	15.65	16.60	17.65	18.80	20.05	21.40	22.85	24.40	26.05	27.80
32		13.20	13.85	14.65	15.50	16.45	17.50	18.65	19.90	21.25	22.70	24.25	25.90	27.65
34		13.10	13.75	14.50	15.35	16.35	17.40	18.55	19.80	21.15	22.60	24.15	25.80	27.55
36		13.05	13.70	14.45	15.30	16.25	17.30	18.45	19.70	21.05	22.50	24.10	25.75	27.50
38		13.00	13.65	14.40	15.25	16.20	17.25	18.40	19.65	21.00	22.50	24.05	25.70	27.45
40			13.60	14.40	15.25	16.20	17.25	18.40	19.65	21.00	22.45	24.00	25.65	27.40
45			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35
50			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35
55			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35
60			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35
65			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35
70			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35
75			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35
80			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35
85			13.60	14.35	15.25	16.15	17.20	18.35	19.60	20.95	22.40	23.95	25.60	27.35

1/ If average log volume does not fall on volume listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Yarding equipment: yarder, single drum, portable tower, radio-controlled skycar.

Static Skyline Yarding-Portable Tower in Clear Cuts

Costs in Dollars Per MBF Gross Volume Yarded 1/ 2/ 3/

TABLE 32 (Cont'd)

Yarding (Slope) Distance in Feet 4/

16 Ft. Log Volume Scrib. Dec.C.	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200
10	54.70	56.70	58.75	60.90	63.15	65.50	67.95	70.50	73.15	75.90	78.80	81.75	85.80	87.95
12	46.30	48.25	50.30	52.45	54.75	57.10	59.55	62.10	64.75	67.50	70.35	73.30	76.35	79.55
14	40.65	42.60	44.65	46.85	49.10	51.45	53.90	56.45	59.10	61.85	64.70	67.70	70.75	73.90
16	36.90	38.85	40.90	43.05	45.30	47.65	50.10	52.65	55.35	58.10	60.95	63.90	66.95	70.10
18	34.35	36.30	38.35	40.50	42.75	45.10	47.60	50.15	52.80	55.55	58.40	61.35	64.40	67.60
20	32.65	34.60	36.65	38.80	41.05	43.45	45.90	48.45	51.10	53.85	56.70	59.65	62.70	65.90
22	31.50	33.45	35.50	37.70	39.95	42.30	44.75	47.30	49.55	52.70	55.55	58.50	61.60	64.75
24	30.75	32.70	34.75	36.90	39.15	41.50	43.95	56.55	49.20	51.95	54.80	57.75	60.80	63.95
26	30.25	32.20	34.25	36.40	38.65	41.00	43.45	46.00	48.70	51.45	54.30	57.25	60.30	63.45
28	29.90	31.85	33.90	36.05	38.30	40.65	43.10	45.70	48.35	51.10	53.95	56.90	59.95	63.10
30	29.65	31.60	33.65	35.85	38.10	40.45	42.90	45.45	48.10	50.85	53.70	56.65	59.75	62.90
32	29.50	31.45	33.50	35.65	37.95	40.30	42.75	45.30	41.95	50.70	53.55	56.50	59.60	62.75
34	29.40	31.35	33.40	35.55	37.85	40.20	42.65	45.20	47.85	50.60	53.45	56.40	59.45	62.65
36	29.35	31.30	33.35	35.50	37.75	40.10	42.55	45.10	47.80	50.55	53.40	56.35	59.40	62.55
38	29.30	31.25	33.30	35.45	37.70	40.05	42.50	45.10	47.75	50.50	53.35	56.30	59.35	62.50
40	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
45	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
50	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
55	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
60	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
65	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
70	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
75	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
80	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50
85	29.25	31.20	33.25	35.40	37.70	40.05	42.50	45.05	47.70	50.45	53.30	56.25	59.35	62.50

1/ If average log volume does not fall on volume listed, use the cost of the next lower log volue.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Yarding Equipment: Yarder, single drum, protable tower, radio-controlled skycar.
4/ Add $3.10 for each additional 100 Ft. beyond 3200 ft.

Basic data, appendix 1, pages 141, 142 and 259.

Illustration 2
(.33 Fl)

Swinging and Loading - High-Lead Hot Deck Swinging

Costs in Dollars Per MBF Gross Volume Swung and Loaded 1/ 2/

TABLE 33

16 Ft. Log Volume Scrib. Dec. C.	Yarding (Slope) Distance in Feet 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	37.50	38.75	40.05	41.35	42.60	43.90	45.20	46.45	47.75	49.05
10	20.05	29.35	30.65	31.90	33.20	34.50	35.75	37.05	38.35	39.60
12	21.75	23.05	24.30	25.60	26.90	28.15	29.45	30.75	32.00	33.30
14	17.50	18.80	20.10	21.35	22.65	23.90	25.20	26.50	27.75	29.05
16	14.65	15.95	17.25	18.50	19.80	21.05	22.35	23.65	24.90	26.20
18	12.75	14.05	15.30	16.60	17.85	19.15	20.45	21.70	23.00	24.30
20	11.45	12.75	14.00	15.30	16.60	17.85	19.15	20.45	21.70	23.00
22	10.60	11.85	13.15	14.45	15.70	17.00	18.25	19.55	20.85	22.10
24	10.00	11.25	12.55	13.85	15.10	16.40	17.70	18.95	20.25	21.55
26	9.60	10.85	12.15	13.45	14.70	16.00	17.30	18.55	19.85	21.10
28	9.30	10.60	11.85	13.15	14.45	15.70	17.00	18.30	19.55	20.85
30	9.10	10.40	11.70	12.95	14.25	15.55	16.80	18.10	19.35	20.65
35	8.85	10.15	11.40	12.70	14.00	15.25	16.55	17.80	19.10	20.40
40	8.70	10.00	11.30	12.55	13.85	15.15	16.40	17.70	18.95	20.25
45	8.65	9.90	11.20	12.50	13.75	15.05	16.35	17.60	18.90	20.20
50	8.60	9.85	11.15	12.40	13.70	15.00	16.25	17.55	18.85	20.10
55	8.50	9.80	11.10	12.35	13.65	14.95	16.20	17.50	18.80	20.05
60	8.45	9.75	11.05	12.30	13.60	14.90	16.15	17.45	18.75	20.00
65	8.40	9.70	11.00	12.25	13.55	14.85	16.10	17.40	18.70	19.95
70	8.35	9.65	10.95	12.20	13.50	14.80	16.05	17.35	18.65	19.90
75	8.30	9.60	10.90	12.15	13.45	14.75	16.00	17.30	18.60	19.85
80	8.25	9.55	10.85	12.10	13.40	14.70	15.95	17.25	18.55	19.80

1/ If volume of average log does not fall on volumes listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Correction for slope - uphill yarding - subtract $0.25 for each 10 per cent of slope from 0 to 60 percent. Use the value for 60 percent for slopes exceeding 60 percent. Downhill yarding - add $0.25 for each 10 percent of slope from 0 to 30 percent. Use the value for 30 percent for slopes exceeding 30 percent.
4/ For distances exceeding 1,000', add $1.20 for each additional 100' of yarding distance.

Basic data, appendix, 1, pages 151, 152 and 257.

High-Lead Hot Deck Swinging

Costs in Dollars Per MBF Cross Volume Swung 1/ 2/

TABLE 34

Yarding (Slope) Distance in Feet 3/ 4/

16 Ft. Log Volume Scrib. Dec.C.	100	200	300	400	500	600	700	800	900	1000
8	26.10	27.00	27.90	28.80	29.65	30.55	31.45	32.35	33.25	34.15
10	19.55	20.45	21.35	22.20	23.10	24.00	24.90	25.80	26.70	27.55
12	15.15	16.05	16.95	17.80	18.70	19.60	20.50	21.40	22.30	23.20
14	12.20	13.10	13.95	14.85	15.75	16.65	17.55	18.45	19.35	20.20
16	10.20	11.10	12.00	12.90	13.80	14.65	15.55	16.45	17.35	18.25
18	8.85	9.75	10.65	11.55	12.45	13.35	14.25	15.10	16.00	16.90
20	7.95	8.85	9.75	10.65	11.55	12.45	13.35	14.20	15.10	16.00
22	7.35	8.25	9.15	10.05	10.95	11.85	12.70	13.60	14.50	15.40
24	6.95	7.85	8.75	9.65	10.50	11.40	12.30	13.20	14.10	15.00
26	6.65	7.55	8.45	9.35	10.25	11.15	12.05	12.90	13.80	14.70
28	6.50	7.35	8.25	9.15	10.05	10.95	11.85	12.75	13.60	14.50
30	6.35	7.25	8.15	9.00	9.90	10.80	11.70	12.60	13.50	14.40
35	6.15	7.05	7.95	8.85	9.75	10.60	11.50	12.40	13.30	14.20
40	6.05	6.95	7.85	8.75	9.65	10.55	11.40	12.30	13,20	14.10
45	6.00	6.90	7.80	8.70	9.60	10.45	11.35	12.25	13.15	14.05
50	5.95	6.85	7.75	8.65	9.55	10.45	11.35	12.20	13.10	14.00
55	5.95	6.85	7.70	8.60	9.50	10.40	11.30	12.20	13.05	13.95
60	5.90	6.80	7.70	8.60	9.45	10.35	11.25	12.15	13.05	13.90
65	5.85	6.75	7.65	8.55	9.45	10.35	11.20	12.10	13.00	13.90
70	5.85	6.70	7.60	8.50	9.40	10.30	11.20	12.10	12.95	13.85
75	5.80	6.70	7.60	8.45	9.35	10.25	11.15	12.05	12.95	13.80
80	5.75	6.65	7.55	8.45	9.35	10.20	11.10	12.00	12.90	13.80

1/ If volume of average log does not fall on volumes listed, use the cost of the next lower log volume.
2/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.
3/ Correction for slope - uphill yarding - subtract $0.16 for each 10 percent of slope from 0 to 60 percent. Use the value for 60 percent for slopes exceeding 60 percent. Downhill yarding - add $0.16 for each 10 percent of slope from 0 to 30 percent. Use the value for 30 percent for slopes exceeding 30 percent.
4/ For distances exceeding 1,000', add $0.85 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 151, 152 and 257.

Illustration 2
(.35)

Illustration 2
(.33G1)

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 35

SWING POLE RIGGING COST - HOT DECK 1/

Tree used only for swinging - $1310

1/ Move in cost not included. For hot deck swinging, add move in cost of an extra yarder from Table 1. This rigging cost is suggested as a guide. The appraiser should judge each logging situation individually and develop appropriate rigging costs.

Basic Data, Appendix 1, Page 153 and 154.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 36

COLD DECK SWINGING

Costs in Dollars per MBF of Gross Volume Actually Swung

16 Ft. Log Volume Scrib. Dec.C.	Hook and Unhook Cost	Swinging Cost per 100' Swing Distance
20	$10.05	$0.75
30	8.69	0.46
35	7.65	0.46
40	6.63	0.46
45	5.62	0.46
50	5.00	0.46
55	4.29	0.46
60	3.99	0.46
65	3.68	0.15
1/ 70	3.40	0.15

1/ In those cases where volumes exceed those listed, use the Hook and Unhook cost for the largest log volume listed.

SWING POLE RIGGING COST - COLD DECK

Rigging Cost - $1310 1/

1/ Normally swinging requires no extra yarder. Therefore, no additional move in cost would normally be allowed. However, the appraiser's logging plan may require two yarders and thus an additional move in allowance. This rigging cost is suggested as a guide. The appraiser should judge each logging situation individual and develop appropriate rigging costs.

Basic Data, Appendix 1, Pages 153 and 154.

Illustration 2
(.33H)

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 37

MOBILE LOADER RIGGING COSTS FOR SMALL SALES 1/

Barko Model 160

First Landing	-	$90.00
Additional Landing	-	$45.00 each 1/

1/ Move in costs not included. See Table 1 for appropriate move in cost. Move in costs are based upon a move in distance of 30 miles. If negotiated sales are being appraised, actual move in distance should be determined and move in cost adjusted accordingly.

2/ The additional landings are considered to be within less than one half hour loader moving time from preceding landings. Care should be taken to adjust when actual conditions vary from this premise. If negotiated sales are being appraised, moving time between landings may be accurately estimated and cost of additional landings adjusted accordingly. Yarding tractor move in cost (1) and rigging cost (Table 10) should be allowed if tractor yarding is contemplated.

Basic data, appendix 1, pages 161 and 162.

MOBILE LOADER LOADING COSTS

See Table 3, Table 6 or Table 11.

Yarding By Mobile Yarder-Loader

Costs In Dollars Per MBF Gross Volume Yarded 1/ 2/

TABLE 38

16 Ft. Log Volume Scrib. Dec.C	Yarding (Slope) Distance in Feet									
	50	100	150	200	250	300	350	400	450	500
4	31.60	32.75	33.95	35.10	36.25	37.45	38.60	39.80	40.95	42.15
6	30.00	31.15	32.35	33.50	34.70	35.85	37.00	38.20	39.35	40.55
8	28.40	29.60	30.75	31.95	33.10	34.30	35.45	36.65	37.80	39.00
10	26.90	28.05	29.25	30.40	31.60	32.75	33.95	35.10	36.25	37.45
12	25.40	26.55	27.75	28.90	30.10	31.25	32.40	33.60	34.75	35.95
14	23.90	25.10	26.25	27.45	28.60	29.80	30.95	32.10	33.30	34.45
16	22.45	23.65	24.80	26.00	27.15	28.35	29.50	30.70	31.85	33.05
18	21.05	22.25	23.40	24.60	25.75	26.95	28.10	29.25	30.45	31.60
20	19.70	20.85	22.05	23.20	24.40	25.55	26.70	27.90	29.05	30.25
22	18.35	19.50	20.70	21.85	23.05	24.20	25.35	26.55	27.70	28.90
24	17.00	18.20	19.35	20.55	21.70	22.90	24.05	25.25	26.40	27.60
26	15.75	16.90	18.10	19.25	20.45	21.60	22.75	23.95	25.10	26.30
28	14.50	15.65	16.80	18.00	19.15	20.35	21.50	22.70	23.85	25.05
30	13.25	14.45	15.60	16.75	17.95	19.10	20.30	21.45	22.65	23.80
32	12.05	13.25	14.40	15.60	16.75	17.95	19.10	20.30	21.45	22.60
34	10.90	12.05	13.25	14.40	15.60	16.75	17.95	19.10	20.30	21.45
36	9.75	10.95	12.10	13.30	14.45	15.65	16.80	18.00	19.15	20.35
38	8.65	9.85	11.00	12.20	13.35	14.55	15.70	16.90	18.05	19.25
40	7.60	8.75	9.95	11.10	12.30	13.45	14.65	15.80	17.00	18.15
44	5.55	6.75	7.90	9.05	10.25	11.40	12.60	13.75	14.95	16.10
48	3.65	4.80	6.00	7.15	8.35	9.50	10.65	11.85	13.00	14.20
52	3.65	3.65	4.20	5.35	6.55	7.70	8.85	10.05	11.20	12.40

1/ In those cases where volumes exceed those listed, use the cost of the largest log volume for the applicable yarding distance.

2/ For distances exceeding 500', add $0.90 for each additional 50' of yarding distance.

Basic data, appendix 1, pages 165, 166 and 272.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 39

LOADING WITH MOBILE YARDER-LOADER
(Skagit SJ5R)

Mobile Yarder-loader Loading Cost -$4.39/M bd. ft.

Basic data, appendix 1, page 169 and 170.

TABLE 40

RIGGING COST FOR MOBILE YARDER-LOADER 1/

Mobile Yarder-loader Rigging Cost - $70.20

1/ Move in costs are not included. See Table 1 for move in costs.

Basic data, appendix 1, page 167 and 168.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 41

MOVE IN COSTS
LOGGING EQUIPMENT FOR COMMERCIAL THINNINGS 1/

Machine	Move in Cost
Light Crawler Tractor (Caterpillar D4D)	$235.00
Rubber-tired Skidder	85.00
Mobile Yarder-loader (SJ-5R)	225.00
Front End Log Loader (rubber-tired)	134.00

1/ If the appraiser anticipates that the logging job will require additional equipment, he should include appropriate move in cost allowances from Table 1, Illustration 2.

Basic data, appendix 1, pages 77-102.

TABLE 42

RIGGING COSTS FOR COMMERCIAL THINNINGS 1/

First Landing - $277.00

Additional Landings - $143.00 each of within 1/2 mile of preceding landing.

Note: If landings are farther apart than 1/2 mile, allow $55.00 for each additional 1/4 mile.

1/ Move in costs not included. See Table 1 (Illustration 2) and/or Table 41 above.

Basic data, appendix, pages 177-184.

Yarding With Light Crawler Tractor - Commercial Thinnings

Costs in Dollars Per MBF Gross Volume Yarded

TABLE 43

16 Ft. Scrib. Log Volume	Yarding Distance in Feet 1/ 2/								
	100	200	300	400	500	600	700	800	900	1000
10	91.85	95.55	99.30	103.05	106.80	110.55	114.25	118.00	121.75	125.50
20	46.40	48.25	50.10	52.00	53.85	55.75	57.60	59.45	61.35	63.20
35	26.75	27.80	28.90	29.95	31.05	32.10	33.15	34.25	35.30	36.35
50	18.90	19.65	20.40	21.15	21.90	22.65	23.40	24.15	24.90	25.65
60	15.90	16.55	17.15	17.80	18.40	19.05	19.65	20.25	20.90	21.50
70	13.75	14.30	14.85	15.35	15.90	16.45	16.95	17.50	18.05	18.55
85	11.45	11.90	12.30	12.75	13.20	13.65	14.10	14.50	14.95	15.40
95	10.30	10.75	11.15	11.60	12.00	12.40	12.85	13.25	13.65	14.10
110	9.00	9.45	9.85	10.25	10.65	11.05	11.50	11.90	12.30	12.70
130	7.90	8.30	8.70	9.15	9.55	10.00	10.40	10.85	11.25	11.70
150	7.05	7.50	7.95	8.35	8.80	9.20	9.65	10.10	10.50	10.95
170	6.50	6.95	7.40	7.80	8.25	8.70	9.15	9.60	10.00	10.45
185	6.10	6.50	6.95	7.40	7.80	8.25	8.65	9.10	9.55	9.95
195	5.90	6.35	6.80	7.20	7.65	8.10	8.50	8.95	9.40	9.80
215	5.60	6.05	6.50	6.95	7.40	7.80	8.25	8.70	9.15	9.60
250	5.10	5.55	5.95	6.40	6.85	7.30	7.75	8.15	8.60	9.05
305	4.70	5.20	5.65	6.15	6.60	7.10	7.55	8.00	8.50	8.95
330	4.50	4.95	5.40	5.85	6.30	6.75	7.20	7.65	8.10	8.60

1/ Distance logs actually travel from choker setting point to landing.
2/ For distances exceeding 1,000', add $0.45 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 171, 172, 263, 264 and 265.

Yarding With Rubber-Tired Skidder - Commercial Thinnings

Costs in Dollars Per MBF Gross Volume Yarded

TABLE 44

16 Ft. Scrib. Log Volume	Yarding Distance in Feet 1/ 2/									
	100	200	300	400	500	600	700	800	900	1000
10	57.05	59.05	60.95	62.80	64.55	66.25	67.90	69.45	70.90	72.35
20	29.10	30.10	31.05	32.00	32.85	33.70	34.55	35.30	36.05	36.75
35	16.95	17.55	18.05	18.60	19.10	19.60	20.05	20.50	20.90	21.30
50	12.50	12.95	13.40	13.85	14.25	14.60	15.00	15.35	15.70	16.00
60	11.25	11.70	12.15	12.60	13.00	13.45	13.80	14.20	14.55	14.90
70	10.35	10.85	11.35	11.80	12.20	12.65	13.05	13.40	13.80	14.15
85	9.10	9.60	10.05	10.45	10.90	11.25	11.65	12.00	12.40	12.70
95	8.75	9.25	9.70	10.15	10.60	11.00	11.40	11.75	12.15	12.45
110	8.05	8.50	8.95	9.40	9.80	10.25	10.60	11.00	11.35	11.65
130	7.60	8.10	8.55	9.00	9.45	9.85	10.25	10.65	11.00	11.40
150	7.30	7.80	8.30	8.75	9.20	9.65	10.05	10.45	10.85	11.20
170	6.95	7.45	7.95	8.45	8.85	9.30	9.75	10.15	10.50	10.85
185	6.75	7.25	7.75	8.25	8.70	9.10	9.55	9.95	10.35	10.70
195	6.65	7.15	7.65	8.10	8.55	9.00	9.40	9.80	10.20	10.55
215	6.50	7.00	7.50	7.95	8.40	8.85	9.30	9.70	10.05	10.45
250	6.30	6.85	7.35	7.85	8.30	8.75	9.20	9.60	10.00	10.35
305	6.15	6.70	7.20	7.70	8.20	8.65	9.10	9.50	9.90	10.30
330	6.05	6.60	7.10	7.65	8.10	8.60	9.05	9.45	9.85	10.25

1/ Distance logs actually travel from choker setting point to landing.
2/ For distances exceeding 1,000', add $0.35 for each additional 100' of yarding distance.

Basic data, appendix 1, pages 173, 174, 266, 267 and 268.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 45

LOADING - COMMERCIAL THINNINGS

(Using Skagit SJ5R as a cold deck loader)

Costs in Dollars Per MBF Gross Volume Loaded

16-Foot Log Volume in Bd. Ft. Scribner	
10	89.48
20	46.79
40	28.51
50	21.18
60	18.27
70	16.23
90	14.17
100	13.15
110	11.78
120	10.94
130	10.59
140	10.25
150	9.74
160	9.39
170	9.05
190	8.71
200	8.54
210	8.21
220	8.03
230	7.86
240	7.69
260	7.35
280	7.01
290	7.01
300	6.95
330	6.83

Basic data, appendix 1, pages 187, 188 and 269.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 46

LOADING - COMMERCIAL THINNINGS

(Using Front End Log Loader in cold deck loading)

Costs in Dollars Per MBF Gross Volume Loaded

16-Foot Log Volume in Bd. Ft. Scribner	
10	29.53
20	15.44
40	9.41
50	6.99
60	6.03
70	5.36
90	4.68
100	4.34
110	3.89
120	3.61
130	3.49
140	3.38
150	3.21
160	3.10
170	2.99
190	2.87
200	2.82
210	2.71
220	2.65
230	2.59
240	2.54
260	2.43
280	2.31
290	2.31
300	2.29
330	2.25

(A) Operating time: Front end loader operation will require 25 percent less time per M bd. ft. than mobile yarder-loader; .750 time factor.

(B) Loading Cost: Ratio of front end log loader cost/minute to mobile yarder-loader cost/minute.

$$\frac{.503}{1.1429/\text{min.}} = .440$$

.750 X .440 = .330 X rate for mobile-yarder loader = rate for front end loader.

Basic data, appendix 1, pages 185, 186 and 269.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 47

LOADING COMMERCIAL THINNING

(Using Barko 160 as a cold deck loader)

Costs in Dollars Per MBF Gross Volume Loaded

16 Foot Log Volume in Bd. Ft. Scribner	
10	41.63
20	21.77
40	13.26
50	9.85
60	8.50
70	7.55
90	6.59
100	6.12
110	5.48
120	5.09
130	4.93
140	4.77
150	4.53
160	4.37
170	4.21
190	4.05
200	3.97
210	3.82
220	3.74
230	3.66
240	3.58
260	3.42
280	3.26
290	3.26
300	3.23
330	3.18

(A) Operating time: Barko 160 operation will require 25% more time per M bd. ft. than mobile yarder - loader, 1.25 time factor.

(B) Loading cost: ratio of Barko 160 cost/min. to mobile yarder - loader cost/min.

$$\frac{.425}{1.1429} = .372$$

1.250 X .372 =.465X rate for mobile - yarder = rate for Barko 160

Basic Data, Appendix 1, Pages 175, 176 and 269.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TRANSPORTATION

TABLE 1

LOG TRUCK HAULING RATES

(Truck - White Model 4964 w/Peerless Trailer)

Straight Time	$30.91/hour $ 0.515/minute
Overtime*	$34.08/hour $ 0.568/minute
Delay Cost	$19.00/hour $ 0.317/minute

*Overtime rate is straight time plus 50% increase in Driver's wage rate.

Basic Data, Appendix 1, Pages 189-192.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TRANSPORTATION

TABLE 2

"EXAMPLE" - HAULING COST COMPUTATION

A. Standard Method - Clocked round trip time includes observed delay time. Hauling cost per MBF net volume is derived from the total gross volume hauled per day.

Maximum day (12 hours) -	720 min.
Minus 30 minutes fixed delay time (for engine warmup, truck servicing and fueling)	-30 min.
Net available operating time	690 min.
Total mean time/round trip (includes observed delays)	210 RTM
Maximum number of trips per day: 690 min. ÷ 210 total mean RTM = 3.29 trips	
Complete round trips 3.0 @ 210 RTM each	630 min.
Minus 7-1/2 hours straight time	-450 min.
Operating overtime	180 min.

Costing time:

450 minutes	
+ 30 minutes fixed delay time	
480 minutes x $0.515/min. straight time 1/ =	$247.20
180 minutes overtime x $0.568/minute 1/ =	$102.24
Total hauling cost, 3 loads	$349.44 day

No. loads/day 3.0 x 5.000 Mbd. ft./gross load = 15,000 M, total gross volume hauled per day

Total hauling cost/day $349.44 ÷ 15.00 M gross volume = $23.30/M gross volume hauled.

$$\frac{\text{(M total net volume) } 2/}{\text{(M total gross merchantable volume)}} = \frac{3,213}{3,570} = 0.90 \text{ log scale recovery (decimal fraction)}$$

Truck haul unit cost = $23.30/M gross volume ÷ 0.90 log scale recovery = $25.89/M net merchantable volume.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 1

MOVE IN COSTS - ROAD CONSTRUCTION

a.	Basic road construction move in cost	$1029
b.	Wheel scraper move in cost	$ 272
c.	3/4 yard shovel move in cost	$ 273
d.	Roller move in cost	
	(1) Grid roller and tractor	$ 219
	(2) Vibratory roller and tractor	$ 129
e.	Dump truck move in cost (8-12 CY)	$ 110
f.	Loader move in cost	
	(1) Front end loader with 2-1/2 cu. yd. bucket- $202	

Basic data, appendix 1, pages 193-214.

Illustration 4
(.35 A3)

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 2

GRUBBING COSTS

D.B.H.	Cost in Dollars per Stump
24	$ 7.90
28	9.90
32	12.00
36	15.80
40	19.70
44	23.55
48	27.45
52	31.30
56	35.20
60	39.13
64	43.00
68	46.85
72	50.75
76	54.60
80	58.55
84	62.35
88	66.30
92	70.20
96	74.05
100	78.00

TABLE 3

CLEARING COST

Total cost of clearing per surface acre - $679.82

Basic data, appendix 1, pages 213, 214 and 271.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 4

EXCAVATION COSTS PER CUBIC YARD 1/
COMMON EXCAVATION

Weighted average cost, all studies - $0.264/yd.

1/ See Tables 9 and 10 for drift cost adjustments and end haul costs.

Basic Data, Appendix 1, Page 272.

ROCK EXCAVATION

Weighted average cost, all studies, all side slopes - $1.95/yd.

Basic Data, Appendix 1, Page 272.

Illustration 4
(.35 A)

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 5

EXCAVATION COST PER STATION
14 FOOT SUBGRADE (10 FOOT USABLE WIDTH)

	COMMON EXCAVATION			ROCK EXCAVATION		
% Side Slope	Cost/ Station	Avg. Cut at Center Line - Ft.	Avg. Cu. Yards/ Station	Cost/ Station	Avg. Cut at Center Line - Ft.	Avg.Cu. Yards Station
0	24.55	1.0	93	124.50	1.0	64
10	24.55	1.0	93	124.50	1.0	64
20	38.80	1.5	147	167.30	1.0	86
30	58.10	2.0	220	186.75	1.5	96
40	84.75	2.7	321	377.35	2.3	194
50	97.70	2.7	370	511.55	2.6	263
60	128.05	4.3	485	764.40	4.2	393
70	164.20	5.0	622	920.00	4.9	473
80	201.45	5.7	763	1106.75	5.7	569
90	239.45	6.3	907	1240.95	6.2	638
100	299.10	7.0	1133	1429.65	7.0	735

Basic data, appendix 1, pages 272-275.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 6

EXCAVATION COSTS PER STATION
20 FOOT SUBGRADE (12 FOOT USABLE WIDTH)

	COMMON EXCAVATION			ROCK EXCAVATION		
% Side Slope	Cost/ Station	Avg. Cut at Center Line-Ft.	Avg. Cu. Yards/ Station	Cost/ Station	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Station
0	34.30	1.2	130	144.30	0.7	74
10	34.30	1.2	130	144.30	0.7	74
20	81.60	2.5	309	232.05	1.0	119
30	91.35	2.5	346	401.70	1.5	206
40	121.95	3.0	462	538.20	2.0	276
50	162.90	4.3	617	992.55	4.3	509
60	202.75	5.0	768	1164.15	5.0	597
70	287.23	7.0	1088	1678.95	7.0	861
80	351.38	8.0	1331	1930.50	8.0	990
90	431.90	9.0	1636	2301.00	9.0	1180
100	539.88	10.0	2045	2603.25	10.0	1335

Basic data, appendix 1, pages 272-275.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 7

EXCAVATION COSTS PER TURNOUT

14 FOOT SUBGRADE (10 FOOT USABLE WIDTH 1/

	COMMON EXCAVATION			ROCK EXCAVATION		
% Side Slope	Cost/ Turnout	Avg.Cut at Center Line-Ft.	Avg.Cu. Yards/ Turnout	Cost/ Turnout	Avg.Cut at Center Line-Ft.	Avg.Cu. Yards/ Turnout
0	7.40	1.3	28	50.70	1.3	26
10	7.40	1.3	28	50.70	1.3	26
20	8.45	2.0	32	103.25	2.0	53
30	12.95	2.7	49	196.95	2.8	101
40	14.00	3.5	53	138.45	3.5	71
50	22.70	4.7	86	206.70	4.7	106
60	82.10	8.0	311	461.70	8.0	255
70	177.95	12.0	674	970.70	12.0	509
80	217.00	13.2	822	1146.60	13.8	588
90	272.45	14.8	1032	1368.90	15.0	702
100	328.68	17.0	1245	1618.50	17.0	830

1/ Standard lengths: 50 foot turnout plus two 25 foot approaches

Basic data, appendix 1, page 272-275.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 8

ROAD CONSTRUCTION AND MAINTENANCE

EXCAVATION COSTS PER TURNOUT
20 FOOT SUBGRADE (12 FOOT USABLE WIDTH) 1/

	COMMON EXCAVATION			ROCK EXCAVATION		
% Side Slope	Cost/ Turnout	Avg.Cut at Center Line-Ft.	Avg.Cu. Yards/ Turnout	Cost/ Turnout	Avg.Cut at Center Line-Ft.	Avg.Cu. Yards/ Turnout
0	20.35	1.7	77	243.75	1.0	125
10	20.35	1.7	77	243.75	1.0	125
20	27.45	3.0	104	356.85	2.5	183
30	31.40	3.1	119	372.45	3.1	191
40	54.65	4.0	207	466.05	4.0	239
50	56.25	5.7	213	407.55	5.6	209
60	279.60	10.1	1059	1700.40	10.1	872
70	453.55	14.0	1718	2560.35	14.0	1313
80	568.65	16.0	2154	3120.00	16.0	1600
90	700.90	18.0	2655	3502.20	18.0	1796
100	825.80	20.0	3128	4093.05	20.0	2099

1/ Standard lengths: 100 foot turnout plus two 50 foot approaches.

Illustrtion 4
(.35)

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 9

ROAD CONSTRUCTION AND MAINTENANCE

ALLOWANCE FOR DRIFT BEYOND 100 FEET

Average Drift Distance in Feet 1/	Cost Increase in Percent 2/	Adjusted Cost per Cubic Yard 3/
100	0	$.26
150	42	$.37
200	79	$.46
250	127	$.59
300	178	$.72
350	213	$.81

1/ Distance from mass center of cut to mass center of fill.
2/ These percentages apply only to tractor cost and not to drilling, blasting or explosive costs.
3/ With basic common excavation cost of $0.264 per yard.

Basic data, appendix 1, pages 272-275.

TABLE 10

EXCAVATION AND END HAUL COSTS 1/

Wheel Tractor Hauling Unit (scraper) and Pusher Tractor

Length of Haul in Feet	Cost per Cubic Yard
500	$0.59
1000	$0.75
1500	$0.90
2000	$1.06
2500	$1.20

1/ Allow wheel scraper move in cost when using this table.

Basic Data, Appendix 1, Pages 215, 216, 276 and 278.

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(Schedule 4)

TABLE 11

SHOVEL EXCAVATION COSTS 1/

Type of Material	Cost per Cubic yard
Easy Digging (common earth - no rocks or roots)	$0.68
Rock, Well Blasted	$0.97
Common Excavation (with rocks and roots intermingled)	$1.16
Rock, Poorly Blasted	$1.80

1/ Allow 3/4 yard shovel move in cost when using this table. Shovel excavation will normally be used only in problem areas.

Basic data, appendix 1, pages 217, 218 and 278.

TABLE 12

SHOVEL LOADING - BANK TO TRUCK 1/

Material	Cost per Loose Cubic Yard - on Truck 2/
Bank run (material in place)	$0.77

1/ Allow 3/4 yard shovel move in and dump truck move in costs when using this table.
2/ Cost is adjusted for swell from bank cubic yards to loose cubic yards.

Basic data, appendix 1, pages 219 and 220.

ROAD CONSTRUCTION AND MAINTENANCE
California

TABLE 13

STANDARD RIVETED ROUND PIPE

Size	Gage	(1) Delivered Price/ft.	(2) Connected Bands Based on 36' each	(2) Connected Bands Based on 36' Pipe L./Ft.	(2) Beveled Based on 36' Pipe L. each	(2) Beveled Based on 36' Pipe L. Per Foot	(2) Shop Eliptical Forming	(3) Installation	Total Cost/foot
18"	16	$ 4.65	$ 7.25	$0.20				$ 3.64	$ 8.49
21"	16	5.30	7.50	0.21				4.10	9.61
24"	14	7.39	8.40	0.23				4.68	12.30
30"	14	9.00	10.10	0.28				5.98	15.26
36"	12	14.93	12.70	0.35			$1.50	7.02	23.80
42"	12	17.77	15.50	0.43			1.75	8.32	28.27
48"	12	20.05	17.10	0.48	$19.00	$0.53	2.00	10.30	33.36
54"	12	25.59	21.80	0.61	23.00	0.64	2.25	12.01	41.10
60"	10	37.47	23.70	0.66	26.00	0.72	2.45	13.42	54.72
66"	10	40.98	76.75	2.13	30.00	0.83	2.70	15.18	61.82
72"	10	44.59	83.30	2.31	33.00	0.92	3.00	16.59	67.41
78"	8	60.90	96.85	2.69	38.00	1.06	3.50	18.62	86.77
84"	8	67.20	104.60	2.91	44.00	1.22	3.50	21.16	95.99
90"	8	71.94	112.05	3.11	50.00	1.39	3.50	23.76	103.70
96"	8	76.91	119.35	3.32	60.00	1.67	4.00	26.88	112.78

(1) Prices as of 4/26/77

(2) 18" Pipe - 7" band
21" to 60" Pipe - 12" band
66" and over Pipe - 24" band

(3) Based on Backhoe installation and average conditions. (1 1/2 dia. common excavation)

9353.3 - PRODUCTION COSTS

(Schedule 4)

California

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 14

STANDARD RIVED PIPE ARCH

Size	Gage	(1) Delivered Price/Ft.	Connecting Bands (2) Based on 36' each	Connecting Bands (2) Based on 36' Pipe L./Ft.	(3) Installation	Total Cost/Ft.
21" x 15"	16	$ 4.97	$ 7.80	$0.22	$ 3.90	$ 9.09
24" x 18"	16	5.63	8.10	0.23	4.50	10.36
28" x 20"	14	7.76	8.95	0.25	5.20	13.21
35" x 24"	14	9.39	11.00	0.31	7.02	16.72
42" x 29"	12	15.42	13.50	0.38	7.80	23.60
49" x 33"	12	18.34	15.60	0.43	9.36	28.09
57" x 38"	12	20.66	17.55	0.49	12.32	33.47
64" x 43"	12	26.28	20.40	0.57	14.87	41.72
71" x 47"	10	38.32	24.30	0.68	16.63	55.63

(1) Prices of January 1977.

(2) Pipes up to 50" - 12" Band
Pipes over 50" - 24" Band

(3) Based on Backhoe installation and average conditions (1 1/2 diameter common excavation)

Illustration 4
(.35)

9353.3 - PRODUCTION COSTS

(Schedule 4)

California

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 15

16 GAGE HALF-ROUND

2 Man hours

Size	Delivered Cost/Ft.	4 Posts-Chain Belts	Installation	Total Cost/Ft.
21"	$3.47	$1.00	$2.80 1/	$ 7.30
24"	4.84	1.00	3.30	9.15
30"	5.89	1.00	3.80 2/	10.70

1/ Installation based on two man hours per 10 ft. length.

2/ Installation based on three man hours per 10 ft. length.

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ROAD CONSTRUCTION AND MAINTENANCE

TABLE 16

LARGE ROUND PIPE AND PIPE ARCHES

These structures are usually designed and require costs specific to the situation. Costs may vary by locality. Therefore, costs should be obtained locally.

TABLE 17

COST OF PERFORATED CULVERT PIPE
(PLAIN GALVANIZED)

Size	Gage	Installed Cost 1/ per Foot
8"	16	$5.00

1/ Price obtained from ARMCO, Portland, Oregon - 4/27/77.

TABLE 18

GRADING (Per 100' Station)

This is based on the use of a motor grader and the time required for finishing the subgrade and pulling the ditch or subgrades up to 20 feet in width. exclusive of ditch.

Grading cost per 100 foot station - $8.06

Basic data, appendix 1, pages 221 and 222.

Illustration 4
(.35)

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California

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 19

Surfacing Costs

1. Rock.

A. Purchased Rock. Cost estimates for commercially produced crushed rock shall be obtained from local sources. Reliable contractors producing appropriate grade and type of rock in quantities required shall be contracted and price quotes requested specific to the road being appraised. Several contractors should be contacted in order to develop reasonable allowances. The "total job" quote, i.e., cost of rock in place, should be obtained whenever possible. If a "total job" quote cannot be obtained, additional costs such as hauling, spreading, etc., should be obtained from other independent local contractors; from following cost tables; or calculated for the specific road using operating cost data from the appendix.

B. Operator Produced Rock. Cost estimates for operator produced rock shall be based on localized district costs. The variation in rock source and quality precludes the use of a single cost estimate to accurately reflect the conditions in all districts. The District/Appraiser and the District Engineer shall compile complete road surfacing costs based on the best local experience available and these costs will be updated annually. Care must be used to insure that the cost estimates received from local contractors are reasonable and in agreement with other contractors'cost estimates. The appraiser should remember that surfacing cost estimates obtained from contractors and operators will contain an allowance for profit and risk. State Office Appraisal and Engineering personnel will check the district surfacing cost estimates annually to insure completeness and accuracy.

C. Pit and Bar Run Rock. Cost estimates for this type of material should be developed for the specific road using local equipment rental rates and production rates. When applicable the appraiser may use the following shovel loading cost table.

Pit and Bar Run (cost of shovel loading) 1/ -	$0.77/cu.yd.

2. Loading. (from stockpile) 2/ - $0.66/cu.yd.

3. Hauling Rock. 3/

First mile or fraction thereof -	$1.69/cu.yd.
Each additional mile beyond first mile -	$0.76/cu.yd.

9353.3 - PRODUCTION COSTS

(Schedule 4)
California
TABLE 19 (cont'd)

ROAD CONSTRUCTION AND MAINTENANCE

4. Spreading Rock. (cost per life) 4/ $ 1.75

5. Rolling Rock. 5/ 6/

Vibratory roller and crawler tractor	$61.72/hour
Vibratory roller and rubber tired tractor	$92.84/hour
Grid roller and crawler tractor	$49.60/hour

6. Watering. 7/

Costs vary considerably, depending on quantity of water, water source, topography, and other elements.

The following costs include haul, source preparation, loading, spreading, and equipment costs.

Crushed graded rock. $0.35 to $0.40 per C.Y. (50 Gal/C.Y.)

1/ Based on rental rate of 3/4 cu. yd. power shovel - add appropriate move in costs for shovel. Dump truck costs not included.

2/ Based on rental rate of front end loader. Dump truck costs not included.

3/ Based on rental rate for normal size 10 cu. yd. (struck measure) dump truck primarily for small operations. Costs will be significantly less for large hauling shows which would provide for more efficient loading and hauling of larger trucks.

4/ Based on ownership rate of Motor Grader - add appropriate move in costs, unless previously allowed under construction equipment move in.

5/ Based on rental rate for rollers and rubber tired loader. Ownership rates for towing tractor add appropriate move in costs for rollers and power units if not previously allowed.

6/ Suggested production rate is 100 cu. yd. per hour of rolling. Appraiser should judge each situation individually and estimate accordingly.

7/ Usual range is 45 to 55 gallons per cu.yd. Appraiser should judge each situation individually and estimate accordingly. Information obtained and adjusted from U.S.F.S. Cost Estimating Guide for Road Construction., Zone 5.

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California

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 20

ROAD MAINTENANCE
(BLACKTOP AND GRAVEL ROADS)

The standard road maintenance special provision under Section 41 of timber sale contracts requires the purchaser to maintain the cross section of dirt or graveled roads as presently existing or where applicable, to the reconstructed standards required by the contract by accomplishing the following items:

1. Grader work - grading, pulling ditches, and slough removal.
2. Loader work - slough removal and cut and fill repair with limited end hauling. (Not involving the use of dump trucks).
3. Backhoe work - catch basin work and culvert work.
4. Hand work - culvert cleaning.

Additional maintenance requirements such as dust abatement, brush trimming, spot surfacing, etc., must be added to the road maintenance special provision in Section 41. Adequate allowance must be made in the appraisal for these added maintenance requirements.

Any work necessary to bring the existing road into shape for the above maintenance should be classified as renovation or road improvement and be a requirement of Exhibit C of the contract. Separate allowance in the appraisal must be made for this work.

Renovation when it is determined by the Area Manager that maintenance required is above what can be accomplished by Section 41, renovation will be specified. Renovation is defined as work that will raise the existing road standard toward but not beyond its original condition. It would include blading, ditching, slide removal, culvert cleaning or replacement, remulching, etc. and shall bring the road up to a standard that is maintainable under Section 41 of the contract.

To determine the extent of renovation that is needed, a condition survey must be made of the road, which will determine types of equipment required and rates per station can be established for allowances.

Road Improvement is defined as work that will improve an existing road to a standard higher than that of its original construction. It also must be to a standard maintainable under Section 41 of the contract.

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 1

SLASH BURNING - CLEAR CUT AREAS

Costs in Dollars Per MBF

Net Volume Per Acre MBF	Clear Cut Acres 1/									
	10	15	20	25	30	40	60	100	150	200
10	3.91	3.23	2.80	2.53	2.34	2.12	1.89	1.55	1.13	.72
15	2.61	2.16	1.87	1.68	1.56	1.41	1.26	1.03	.76	.48
20	1.96	1.62	1.40	1.26	1.17	1.06	.94	.77	.57	.36
25	1.57	1.29	1.12	1.01	.94	.85	.75	.62	.45	.29
30	1.30	1.08	.93	.84	.78	.71	.63	.52	.38	.24
35	1.12	.92	.80	.72	.67	.61	.54	.44	.32	.21
40	.98	.81	.70	.63	.59	.53	.47	.39	.28	.18
45	.87	.72	.62	.56	.52	.47	.42	.34	.25	.16
50	.78	.65	.56	.51	.47	.42	.38	.31	.23	.14
60	.65	.54	.47	.42	.39	.35	.31	.26	.19	.12
70	.56	.46	.40	.36	.33	.30	.27	.22	.16	.10
90	.43	.36	.31	.28	.26	.24	.21	.17	.13	.08
100	.39	.32	.28	.25	.23	.21	.19	.15	.11	.07

1/ Clear cut acreage to be burned in entire sale area.

Basic data, appendix 1, page 280.

TABLE 2

SLASH BURNING - CLEAR CUT AREAS

Costs in Dollars Per Acre

Clear Cut Acres 1/									
10	15	20	25	30	40	60	100	150	200
39.14	32.33	28.03	25.26	23.42	21.20	18.86	15.46	11.34	7.23

1/ Clear cut acreage to be burned in entire sale area.

Basic data, appendix 1, page 280.

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(Schedule 4)

California

TABLE 3

FIRE PROTECTION COSTS

Timber Sale Size	With Portable Pump	With Trailer Mounted Pump	With Truck Mounted Pump
Up to 3MM bd.ft	$0.32/M bd.ft.	$0.43/M bd.ft.	$0.51/M bd.ft.
3MM to 8MM bd.ft.	$985.60 plus $ 0.075/M bd.ft.	$988+$0.19/M bd. ft.	$955.60+$0.26/ M bd.ft.
8MM bd.ft. and larger	$2,573.20	$3,464.00	$4,051.00

TABLE 4

FIRE LINE COSTS - CLEAR CUT AREAS
(Preparation for burning)

	Cost per Mile	Cost per Station
Tractor	$385.00	$ 7.30
Hand Trail	$805.00	$15.25

Basic data, appendix 1, page 281

TABLE 4a

ALTERNATE FIRE LINE COSTS - OREGON - CLEARCUT AREAS

	Low	Medium	High	Low	Medium	High
	DOUGLAS FIR REGION					
Tractor	$ 400	$ 860	$1500	$ 7.60	$16.30	$28.40
Hand	$1100	$2200	$4300	$20.85	$41.65	$81.45
	PINE REGION					
Tractor	$ 100	$ 250	$ 350	$ 1.90	$ 4.75	$ 6.65
Hand	$ 500	$ 800	$1300	$ 9.45	$15.15	$24.60

9353.3 - PRODUCTION COSTS

(Schedule 4)

TABLE 5

OTHER SLASH DISPOSAL PRACTICES

Lopping and Scattering Tops (above merchantable stem). The additional expense of this requirement can be recognized in the appraisal by an adequate falling and bucking cost allowance:

Old Growth Timber - Increase falling and bucking tabular costs (Table 1 or Table 4 Illustration 1) for factor of 1.15.

Commercial Thinnings or Other Young Timber - Increase falling and bucking tabular costs (Table 3 Illustration 1) by factor of 1.20.

Piling and Burning (Cleanup of roadside slash and reduction of slash concentrations).

Machine Piling - Estimate hours of piling required for Caterpillar D7 Tractor with brush blade. Make allowance @$47.96/hour for tractor and operator.

Hand Piling - Range of $99.00 to $199.00 per acre, depending on topography and timber volumes cut per acre.

Burning Piled Slash (if purchaser burning is to be required) - Range of $13.00 to $50.00 per acre, depending on topography and timber volumes cut per acre.

Chipping (using self-powered, trailer-mounted 16 inch chipper towed by four-wheel drive truck) - $12.00 per MBF gross volume cut, per acre.

Basic data, Appendix 1, Page 282

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APPENDIX 1 - BASIC DATA

TREE TO POND COSTS

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A. Wage Rates and Manpower

1. Date Source. Wage rate data was obtained from: Timber Operators Council Inc., 6825 SW Sandburg Street, Tigard, Oregon 97223. These rates were compiled and averaged from responses received from operators in the northern California region, during 1977.

a. Adjustment Factors. Basic wages are adjusted to a total of 1.64% plus a travel cost equivalent to $1.09 per hour. The average wage is increased by a total of 1.79% when the travel and other employer costs are added together. The component parts of this adjustment factor are shown below:

(1) Workmen's Benefits

(i)	Health and Welfare -	$0.71/hour
(ii)	Paid Holidays -	$0.23/hour
(iii)	Paid Vacation -	$0.41/hour
(iv)	Pensions -	$0.26/hour
(v)	Hoot Owl Differential -	$0.06/hour
		$1.67/hour

$1.67/$7.43 (average wage) = 22.4% for Workmen's Benefits.

(2) Direct Supervision - This item has been increased to 13.5% of the basic wage rate. This increase is based on current estimates from Industry and the U.S. Forest Service, and reflects an increased emphasis on environmental protection measures.

(3) Employer Contributions - Northern California

(i)	Unemployment Compensation -	4.6%
(ii)	Industrial Accident -	17.8%
(iii)	Social Security -	6.05%
(iv)	FUTA (Federal Unemployment) -	0.5%
		28.95%

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(4) Transportation and Travel. Transportation and travel were included as a part of the hourly wage for each position. The transportation was added to the wages for each position after the basic wage rages were increased by 1.64%. The Timber Operators Council indicates that basic wages are increased by $0.50/hour to cover transportation. The cost of the crew truck was calculated and added to the $0.50 to arrive at a transportation cost per hour. The calculations are shown below:

Vehicle Allowance $0.97 fixed cost x 7 hours = $ 6.79

$3.32 total cost x 2 hours = $ 6.64
Total $13.43

$13.43 ÷ 7 men = $1.91 ÷ 9 hours/day = $ 0.21

Driver Allowance 12.22 (Dump Truck Driver rate) x 2 hours = $24.44

$24.44 ÷ 7 men = 3.49 ÷ 9 hours/day = $ 0.38

Total Travel Allowance = $0.50 + $0.21 + $0.38 = $ 1.09/man/hour

9353.3 - PRODUCTION COSTS

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2. Hourly Wage Rate - Northern California - Oregon's Schedule 20 indicates that work days in excess of an 8-hour work day were the rule, rather than the exception, especially in the Medord District. It has felt that this pattern probably existed in Northern California as well. This schedule assumes a 9-hour work day with 8 hours at regular time and 1 hour at the overtime rate of 1.5 times basic salary. The overtime hour is adjusted for workmen's benefits (except paid holidays and vacations), general supervision, and employer's contributions. The overtime rates do not include allowances for transportation, travel or call time.

9353.3 - PRODUCTION COSTS

(Schedule 4)

a. Hourly Wage Rate Adjustment. Should the 9-hour day not be the normal working day, wage rates from the wage rate summary (Appendix 1, Page 5) can be adjusted to the actual working day. Do not apply these adjustment factors to any component except the wage rates.

Factor	Work Day-Hours
.97	9-8
.99	9-8-1/2
1.01	9-9-1/2
1.02	9-10
1.03	9-10-1/2
1.04	9-11

9353.3 - PRODUCTION COST
(Schedule 4)

3. WAGE RATE SUMMARY - NORTHERN CALIFORNIA LOGGING

Crew Position	Basic Wage/hr.	BLM Adjusted Wage Per Hour Straight Time	BLM Adjusted Wage Per Hour Over Time	BLM Adjusted Wage Based on a 9-hour day Per Hour	BLM Adjusted Wage Based on a 9-hour day Per Min.
Chaser	$6.69	$12.12	$13.90	$12.32	$ .205
Drill Operator	6.15	11.28	12.78	11.44	.191
Dump Truck Op.	6.75	12.22	14.03	12.42	.207
Faller & Bucker	9.11	16.11	18.93	16.42	.274
Grader Operator	7.36	13.22	15.29	13.45	.224
Head Rigger	7.15	12.88	14.86	13.10	.218
Hook Tender	8.23	14.65	17.10	14.92	.249
Loading Engineer	7.68	13.75	15.96	14.00	.233
Log Truck Driver 1/	6.69	11.03	13.90	11.35	.189
Powder Man	6.99	12.61	14.53	12.82	.214
Rigging Slinger	7.03	12.68	14.61	12.89	.215
Shovel Operator	7.75	13.87	16.11	14.12	.235
Tractor Op. (Large)	8.11	14.46	16.85	14.73	.245
Tractor Op. (Small)	7.78	13.92	16.17	14.17	.236
Yarding Engineer	7.26	13.06	15.09	13.29	.221
Choker Setter	6.15	11.28	12.78	11.44	.191
Average Crew Position	7.13	13.52	14.67	13.65	.227

1/ No transportation allowance

Summary of Adjustments	Straight Time	Overtime (Over 8 hours)
Workman's Benefits	22.4 %	13.9 %
Direct Supervision	13.5 %	13.5 %
Employer Contribution	28.95%	11.15%
	64.85%	38.55%

Travel	
Travel Allowance	$0.50/hour
Allowance - Driver	$0.38/hour
Vehicle Allowance	$0.21/hour
Total	$1.09/hour

9353.3 - PRODUCTION COSTS

(Schedule 4)

B. Machine Rates

The basic cost information in these rate schedules is of special interest to the field appraiser whenever he finds reason to believe the cost tables in this schedule are not representative of conditions for the individual tract being appraised. The basic cost data will provide information to make adjustments in allowances to compensate for special or unusual conditions. Care must be taken that the cost information is applied in the context and manner in which it was compiled.

1. Data Source.

a. Machine Ownership. Information on basic machine costs and operations was obtained from an Oregon survey of sample forest industry companies, both large and small, as well as business firms who supply equipment and related supplies. Limited information was obtained from local governments on machine ownership and maintenance costs. Local BLM district surveys were made in an attempt to identify the type of equipment most commonly found in the woods for logging shows similar to BLM timber sales. Rates on property taxes were solicated from local county tax offices and insurance rates were obtained from local insurance firms who commonly write coverage for logging and road construction operators. There are no extensions of costs for anticipated future increases or decreases in any machine rates. The purchase price of the equipment was increased by 6% to account for the California sales tax.

9353.3 - PRODUCTION COSTS

(Schedule 4)

b. Machine Rental. Rental rates included in the schedule were obtained from: "Rental Rate Blue Book for Construction Equipment", published by: Equipment Guide Book Co., P.O. Box 10113, Palo Alto, California 94303.

Rental rates are applied to equipment which the "average operator" does not normally own. This is not to say all ownership equipment is commonly owned by all operators. For example, an average logger may not own a variety of road building machines; however, he may commonly subcontract road building to construction companies who would own such equipment. It is assumed an integrated logging contractor or typical timber industry operator would usually only rent the types of machines for which rental rates have been used.

Rental rates for the type of equipment in this category should be obtained from local sources; when such machines are available in the area of the appraisal, and when rates appear to be substantially different than the "Blue Book" schedule. Appraisers should not allow rates in excess of those included in this schedule unless it can be substantiated such equipment is not readily available at the established rate. Ownership and rental rates are included for the motor grader. Ownership rates are appropriate for initial road construction; rental should be considered for road maintenance, during and after logging. Rental rates for machines not listed in the schedule must be obtained from local sources.

9353.3 - PRODUCTION COSTS

(Schedule 4)

2. Components of Machine Rates.

a. Ownership Rates. Individual machine rates, both fixed and operating costs, were developed for each piece of equipment used in the schedule. Machine rates include;

(1) Total Investment (depreciable value). This item covers the basic machine and related equipment Acquisition cost--ready "to log". It does not include equipment requiring frequent replacement such as cables, lines and chokers, tires, etc., other than items which come on the machine when purchased. The residual value was estimated at the end of the machine's useful life when full maintenance had been applied or at the end of the first depreciable period, whichever seemed appropriate for the specific machine. The total investment (depreciable value) is the difference between the acquisition cost and residual values.

(2) Average Annual Investment. This item is computed for the purpose of estimating the fixed costs of insurance and property taxes. The formula, $AAI = \frac{A + r}{2} + \frac{d}{2}$ is used to determine this investment where:

AAI = Average Annual Investment
A = Original Total Acquisition Cost of New Machine
r = Residual Value - or value of the machine at the end of the useful life or first depreciable period when full maintenance has been applied
d = Straight line depreciation per year

(3) Fixed Costs. This cost category includes ownership costs whether the machine is operating or not.

(1) Depreciation. Straight line depreciation is used in this cost schedule. The depreciable value (total investment - 6% sales tax) divided by the depreciable period (useful life or first depreciable period) equals the depreciation.

Thus: $\frac{Ac - RV}{DP}$ = Depreciation

When: Ac - is acquisition value
RV - is residual value
DP - is depreciation period (usually expressed in hours)

(11) Insurance. Average property insurance rates for logging equipment was solicited from a major company writing such insurance in California. Much of the variance related to individual operator's experience, preference rates, and the type of insurance "packages" purchased. The average for California is 1.75% of average annual investment.

9353.3 - PRODUCTION COSTS

(Schedule 4)

(iii) Property Taxes. Individual county tax offices in the western Oregon districts were solicited for tax rates applicable to logging equipment. The average considered appropriate for Schedule 4 was 2.5% of average annual investment.

(4) Operating Costs. This cost category includes all materials incidental to operating the machine and replacement items which recur annually or more frequently, depending on actual operating time.

(i) Fuel and lubrication costs were obtained from a California survey of delivered materials made in the winter of 1978.

Fuel and lubrication rates used in Schedule 4 are:

Diesel fuel - without tax	$0.45/gal.
Gasoline - with tax	$0.60/gal.
Lubricating oil - with tax	$2.17/gal.
Hydraulic oil - with tax	$2.16/gal.
Gear grease	$0.44/lb.

(ii) Repairs and maintenance costs were generally determined as a percentage of depreciation as found common for the particular type of machine. This item was obtained as an estimate from equipment firms and companies owning and operating specific types and models of machines used in the schedule.

(iii) Other operating expenses such as wire rope, chokers, chains for chain saws, etc., were obtained locally from established suppliers of such material.

9353.3 - PRODUCTION COSTS

(Schedule 4)

b. Rental Rates. Individual machine rental rates apply to actual machine operating times, i.e., clock time on the machine. When using rental rates care must be used so that they are applied in this manner, particularly if delay time is a factor in the cost estimate. These rates include fuel, oil, lubrication, repairs, maintenance, insurance and individual expenses. Additional allowance should be made for drill steel and bits, etc., expendable items and supplies. Rates are indicative of those charged for machines of modern design and in good working condition. Rates provide that the equipment is available on the job. It is necessary to allow appropriate move-in as an additional item of cost.

9353.3 - PRODUCTION COSTS

(Schedule 4)

3. Individual Machine Rates.

Machine	Fixed Cost/Hour	Operating Cost/Hour	Total Machine Cost/Hour
a. Chain Saw - McCulloch - SP-125	$ 0.41	$ 1.09	$ 1.50
b. Tractors			
(1) Light Yarding Tractor Caterpillar D4D w/dozer & winch	5.19	4.73	9.92
(2) Yarding Crawler Tractor Caterpillar D7D w/power shift	13.30	15.57	28.87
(3) FMC 210 CA	14.25	18.48	32.73
(4) Rubber-tired Four-wheel Skidder John Deere - 440B (70 HP)	4.57	6.02	10.59
(5) Light (Msc. Use) Crawler Tractor Caterpillar D6C w/blade & winch	9.96	9.55	19.51
(6) Tractor Mounted Dozer Caterpillar D8K (Power Shift) w/bulldozer and ripper	19.09	20.20	39.29
c. Yarders			
(1) Swing Boom Yarder Washington 78A	22.57	14.37	36.94
(2) Yarder-Portable 90' Tower - Trailer Mounted w/Berger Yarder	21.35	19.24	40.59
(3) Yarder - Portable 110' Tower - Trailer Mounted w/skagit Yarder	41.31	29.16	70.47
(4) Static Skyline - Portable 110' Tower - Skagit BU-98 Yarder & 110' Tower	77.96	54.70	132.66
(5) Mobile Yarder-Loader Skagit SJ-5R (Used)	12.83	11.75	24.58
d. Loaders			
(1) Light Mobile Log Loader Barko Model 160	4.62	4.58	9.20

9353.3 - PRODUCTION COSTS

(Schedule 4)

(2)	Heavy Mobile Log Loader	$ 9.72	$6.94	$16.66
(3)	Hydrolic Barko 450 (Rubber-Tired)	10.38	7.48	17.86
(4)	Front End Log Loader - Rubber - tired Caterpillar 966C (170HP)	6.14	8.74	14.88
	e. Air Compressor and Drill Combinations			
(1)	Air Compressor & Drill - 150 CFM	(Rental Rate)		11.19
(2)	Air Compressor & Track Drill - 600 CFM	(Rental Rate)		64.91
	f. Scraper			
(1)	Motor Scraper - Two Wheel Tractor 12 to 19 C.Y. Capacity	(Rental Rate)		75.40
	g. Shovel			
(1)	Shovel - Power 3/4 C.Y. Capacity	(Rental Rate)		35.42
	h. Front End Loader			
(1)	Front End (Bucket) Loader - Rubber-tired Caterpillar 950 - 2 to 2-1/2 C.Y. Rental	(Rental Rate)		45.55
	i. Rollers			
(1)	Road Roller - Vibratory 27 to 36 HP	(Rental Rate)		24.68
(2)	Road Roller - Grid, 16 Ton	(Rental Rate)		13.66
	j. Graders			
(1)	Motor Grader BTWN - 2700 & 31,000 lbs.	(Rental Rate)		38.90
(2)	Motor Grader - Cat No. 12F	4.91	5.54	10.45
	k. Dump Truck			
(1)	8 to 12 C.Y. Capacity	(Rental Rate)		37.49
	l. Low boy Trailer			
(1)	Lowbed Trailer w/Tractor 3 axle Trailer Tractor 65-90,000 GVW - Rental	33.82	6.75	40.57
	m. Log Truck			
(1)	Logging Truck White - Model 4964WD with Peerless Trailer	6.59	9.32	17.08
	o. Crew Car			
(1)	Crew Car (9-passenger carryall) GMC - 3/4 Ton	.97	3.32	4.29

9353.3 - PRODUCTION COSTS

(Schedule 4)

4. Rate Computations. Individual rate computations are listed in the sequence shown on the machine rate summary. Rate computation sheets summarize significant cost items. Smaller items such as towing cable sizes and lengths, rigging composition, number and sizes of tires, etc., have been individually listed and summerized. Wherever possible, complete machine costs - "ready to log" - were used. Distinction between ownership and rental rates are apparent.

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. a-1

I Description Chainsaw - McCulloch SP-125; 36" bar, direct drive, automatic oiler w/misc. small tools including fire extinguisher.

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 0.41 /hr.	$ _____/hr.
B. Operating	$ 1.09 /hr.	$ _____/hr.
Total	$ 1.50 /hr.	$ _____/hr.
.....	$ 0.025 /min.	$ _____/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 610.56

Attachments Small tools 148.76

Total $ 759.32

B. Residual Value (total) ..... $ 115.00

Chainsaw based on 20 % of investment.

for 1,600 hrs. of (useful life-first depreciable period)

Small tools based on 0 % of investment.

for 1600 hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 644.32

D. Average Annual Investment ..... $ 716.00 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 0.41 /hr.
(based on 1,600 hours of annual machine availability)

A. Depreciation ..... $ 0.40

* B. Insurance (rate _____% of ave. ann. invest.) $ 0
Annual Cost of $ _____.

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 0.011
Annual Cost of $ 17.90 .

V. Operating Cost (per hour of operation) ..... $ 1.09

A. Fuel (diesel - gas) .....$ 0.226 /hr.

3 gal. per hour for $ 0.603 per gal.

1/ B. Oil and Grease .....$ 0.20 /hr.
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 0.36 /hr.
90 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)
Chain replacement @ 133 hours, 12 replacements per year @ $ 39.75/chain =$477
$477 ÷ 1600 hours/year = $ 0.30/hour

VI Remarks - 1/ (Note: All costs are included in rental rates.)

* Cost of insurance for chainsaws is prohibitive.
1/ Dealer estimate.

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. 6-1

I Description Light yarding tractor - Caterpillar D4D w/dozer and winch drum lines, butt rigging, etc. "Ready to log"

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ 5.19 /hr.	$ _____ /hr.
B. Operating	$ 4.73 /hr.	$ _____ /hr.
Total	$ 9.92 /hr.	$ _____ /hr.
.....	$ 0.165 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 43,888.24

Attachments As listed above

TOTAL $ 44,094.94

B. Residual Value (total) ..... $ 4,140

Basic machine based on 10 % of investment.

for 10,000 hrs. of (useful life-first depreciable period)

Drumline and rigging based on 0 % of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 39,954.00

D. Average Annual Investment .....$ 28,112.87 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 5.19 /hr.
(based on 1000 hours of annual machine availability)

A. Depreciation ..... $ 3.99

B. Insurance (rate 1.79 % of ave. ann. invest.) $ 0.50
Annual Cost of $ _____.

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 0.70
Annual Cost of $ 702.82.

V. Operating Cost (per hour of operation) ..... $ 4.73

A. Fuel (diesel - gas) .....$ 1.17 /hr.

2.6 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.24 /hr.
Lube oil - Crankcase .02 gph @ $ 2.17 per gal.
Trans. & Drive .02 gph @ $ 2.17 per gal.
Hyd. Oil .01 gph @ $ 2.16 per gal.
Grease .05 lbs. per hr. @ $ 0.44 per lbs.
Filters $ 0.06 per hr.

C. Repairs and Maintenance ..... $ 2.39 /hr.
60 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)
Towing cable: 150' of 3/4" @$0.73/ft. = 109.71
Ferrule = 8.77
118.48 ÷ 1000 hrs. =
$ 0.12/hour

VI Remarks - 1/ (Note: All costs are included in rental rates.)

Chokers: Deduction for recovery of ½ value of choker hook, ferrule & S.S. sleeve. Hook = $5.39
Ferrule = 6.13
S.S. Sleeve = 3.66
15.18 ÷ 2 = $7.59

Choker Cost: $29.28
- 7.59
21.69

Replace 3 @ 80 hours = (3 x 21.69) = $0.81/hour

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. b-2

I Description Yarding crawler tractor - Caterpillar D7G, power shift, S dozer, winch and lower guards - conventional

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ 13.30 /hr.	$ _____ /hr.
B. Operating	$ 15.57 /hr.	$ _____ /hr.
Total	$ 28.87 /hr.	$ _____ /hr.
.....	$ 0.48 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 115,878

Attachments As listed above

_____ $ _____

B. Residual Value (total) ..... $ 27,380

Total based on 25 % of investment.

for 8400 hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 88,498

D. Average Annual Investment .....$ 77,950 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 13.30 /hr.
(based on 1200 hours of annual machine availability)

A. Depreciation ..... $ 10.54

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 1.14
Annual Cost of $ 1364.12 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 1.62
Annual Cost of $ 1948.75 .

V. Operating Cost (per hour of operation) ..... $ 15.57

A. Fuel (diesel - gas) .....$ 3.38 /hr.

7.5 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.29 /hr.
Lube oil - Crankcase .03 gph @ $ 2.17 per gal.
Trans. & Drive .04 gph @ $ 2.17 per gal.
Hyd. Oil .03 gph @ $ 2.16 per gal.
Grease .03 lbs. per hr. @ $ 0.44 per lbs.
Filters $ .07 per hr.

C. Repairs and Maintenance ..... $ 9.91 /hr.
94 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify) Towing cable: 150' of 1¼"@ $1.62/ft.=
$ 243.27 + 8.79 = $252.05, replace every 1000 hours
or $252.05 ÷ 1000 = $ 0.25/hour
Chokers: 3/4" x 25' = 30.63 + 10.60 = $41.23/choker.

VI Remarks - 1/ (Note: All costs are included in rental rates.)

Initial 3 sets chokers - 41.23 x 3 = $123.70
Replacement each 80 hours requires
312 chokers @ $41.23 = $12,865.01
½ hook replacements requires
156 hooks @ 10.60 = $1653.60
Total $14,642.31 ÷ 8400 hrs.
= $1.74

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. b-3

I Description FMC 210CA-Choker Arch-high speed logging vehicle, "Low ground pressure tractor"

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 14.25 /hr.	$ _____ /hr.
B. Operating	$ 18.48 /hr.	$ _____ /hr.
Total	$ 32.73 /hr.	$ _____ /hr.
.....	$ 0.545 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 105,294
Hyster Winch 2,915
Attachments 75' of 3/4" wire rope 58

TOTAL $ 108,267

B. Residual Value (total) ..... $ 25,521

Machine & Winch based on 25 % of investment.

for 7000 hrs. of (useful life-~~first depreciable~~ period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 82,746

D. Average Annual Investment ..... $ 74,578 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 14.25 /hr.
(based on 1300 hours of annual machine availability)

A. Depreciation ..... $ 11.82

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 1.00
Annual Cost of $ 1305.11 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 1.43
Annual Cost of $ 1864.45 .

V. Operating Cost (per hour of operation) ..... $ 18.48

A. Fuel (diesel - gas) .....$ 2.70 /hr.

6 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.68 /hr. (25% of fuel cost)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 10.63 /hr.
90 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)
Replace tracks @ 4000 hours = $ 9540 ÷ 4000 = $2.39/hr.
Towing Cable: 75' of 3/4" @ $ 0.80 = $ 60.00
Ferrule = 8.87
$ 68.87 ÷ 1000 = $0.07/hr.

VI Remarks - 1/ (Note: All costs are included in rental rates.)
Chokers: Deduction for recovery of 1/2 value of the choker hook.
Choker; 3/4" x 20' = $ 26.82
Light hook = $ 10.60
$ 37.42
Replacement of 1/2 of 10.60 = 5.30 - 5.30
Total $ 32.12
Choker cost = $32.12 x 5 chokers = $ 160.59
Replace @ 80 hours; 160.59 ÷ 80 = $2.01/hour

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. b-4

I Description RUBBER TIRED FOUR WHEEL SKIDDER JOHN DEERE 440B-70 H.P. W/BLADE AND WINCH "READY TO LOG"

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 4.57 /hr.	$ _____/hr.
B. Operating	$ 6.02 /hr.	$ _____/hr.
Total	$ 10.59 /hr.	$ _____/hr.
.....	$ 0.177 /min.	$ _____/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 33814

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ 12760

TOTAL based on 40 % of investment.

for 6000 hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 21054

D. Average Annual Investment .....$ 25041 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 4.57 /hr.
(based on 1000 hours of annual machine availability)

A. Depreciation ..... $ 3.50

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 0.44
Annual Cost of $ 438.22 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 0.63
Annual Cost of $ 626.03 .

V. Operating Cost (per hour of operation) ..... $ 6.02

A. Fuel (diesel - gas) .....$ 0.90 /hr.

2 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.31 /hr.
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 3.16 /hr.
90 % of depreciation

D. Tires ..... $ 0.39 /hr.
$ 2320 total cost @ "6000" hrs. of tire life.

E. Other (specify)
Tires : 1 replacement = 6000 hr. life of 440 B skidder
4 Tires : 18.4 x 26 ; 10 ply = 580.03 / tire = 2320

VI Remarks - 1/ (Note: All costs are included in rental rates.)
Chokers : 6 chokers replace @ 80 hours.
15' of 1/2" cat choker = $14.63
Midget Ball hook = 4.45
Replacement : 1/2 x 4.45 = 2.23
$16.85 x 6 = $101.10
$101.10 ÷ 80 = $1.26/hr.

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. b-5

I Description Light misc. use crawler tractor. Caterpillar D6C w/ dozer blade and winch.

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 9.96 /hr.	$ _____ /hr.
B. Operating	$ 9.55 /hr.	$ _____ /hr.
Total	$ 19.51 /hr.	$ _____ /hr.
.....	$ .325 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 87,417.14

Attachments all included in above price $ -

B. Residual Value (total) ..... $ 16,469

Total machine based on 20 % of investment.

for 8,400 hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 70,948.14

D. Average Annual Investment ..... $ 57,010.71 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 9.96 /hr.
(based on 1,600 hours of annual machine availability)

A. Depreciation ..... $ 8.45

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 0.62
Annual Cost of $ 997.69 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 0.89
Annual Cost of $ 1425.27 .

V. Operating Cost (per hour of operation) ..... $ 9.55

A. Fuel (diesel - gas) .....$ 1.58 /hr.

3.5 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.25 /hr.
Lube oil - Crankcase .04 gph @ $ 2.17 per gal.
Trans. & Drive .02 gph @ $ 2.17 per gal.
Hyd. Oil .02 gph @ $ 2.16 per gal.
Grease .05 lbs. per hr. @ $ 0.44 per lbs.
Filters $ .06 per hr.

C. Repairs and Maintenance ..... $ 7.60 /hr.
90 % of depreciation

D. Tires ..... $ _____/hr.
$ _____ total cost @ "_____" hrs. of tire life.

E. Other (specify)
Towing cables: Replace 7 times during the depreciation period. 200' @ $0.691/ft. x 7 replacements = $1023.96.
$1023.96 ÷ 8400 hrs. = $ 0.12/hour.

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. b-6

I Description Tractor mounted dozer - Caterpillar D8K power shift 8U dozer w/tilt cylinder, 8D ripper w/2 shanks. "Ready for road building"

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 19.09 /hr.	$ _____ /hr.
B. Operating	$ 20.20 /hr.	$ _____ /hr.
Total	$ 39.29 /hr.	$ _____ /hr.
.....	$ 0.655 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 166,488.90

Attachments Complete

_____ $ _____

B. Residual Value (total) ..... $ 39,266

TOTAL MACHINE based on 25 % of investment.

for 8400 hrs. of (useful life-~~first depreciable~~ period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 127,222

D. Average Annual Investment ..... $ 111,292 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 19.09 /hr.
(based on 1200 hours of annual machine availability)

A. Depreciation ..... $ 15.15

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 1.62
Annual Cost of $ 1947.61 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 2.32
Annual Cost of $ 2782.30 .

V. Operating Cost (per hour of operation) ..... $ 20.20

A. Fuel (diesel - gas) .....$ 4.68 /hr.

10.4 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.52 /hr.
Lube oil - Crankcase .07 gph @ $ 2.17 per gal.
Trans. & Drive .05 gph @ $ 2.17 per gal.
Hyd. Oil .03 gph @ $ 2.16 per gal.
Grease .05 lbs. per hr. @ $ 0.44 per lbs.
Filters $ 0.18 per hr.

C. Repairs and Maintenance ..... $ 9.09 /hr.
60 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)
Cutting edges: 3 replacements every 1000 hours
21 replacements -- 1 5/8" heavy duty edges @ $ 164.17
21 x 164.17 = 3447.57 ÷ 8400 = $ 4.10 / hour

VI Remarks - 1/ (Note: All costs are included in rental rates.)

End Bits: Hot coupling heavy duty. 2 replaced every 1000 hours = 14 bits @ 108.63

14 x 108.63 = 1520.82
1520.82 ÷ 8400 = $ 1.81 / hour

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. C-1

I Description Medium yarder, Washington 78A Skylock yarder w/swingboom, track yarder, Cummings V555 197 HP Diesel engine. Rigged for highlead yarding.

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ 22.57 /hr.	$ _____ /hr.
B. Operating	$ 14.37 /hr.	$ _____ /hr.
Total	$ 36.94 /hr.	$ _____ /hr.
.....	$ 0.62 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 312,700

Attachments 9,010

Total $ 321,710

B. Residual Value (total) ..... $ 44,250

Yarder-tower based on 15 % of investment.

for 16,000 hrs. of (useful life-first depreciable period)

Asst. rigging based on 0 % of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 277,460

D. Average Annual Investment .....$ 196,853 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 22.57 /hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ 17.37

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 2.15
Annual Cost of $ 3,444.92.

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 3.08
Annual Cost of $ 4921.32.

V. Operating Cost (per hour of operation) ..... $ 14.37

A. Fuel (diesel - gas) .....$ 4.77 /hr.

10.6 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 1.19 /hr. (25% of fuel cost)
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 5.20 /hr.
30 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify) Wire rope and chokers
Mainline : 1050' of 3/4" @ $0.77/ft. = $808.50
Haulback : 2100' of 5/8" @ $0.53/ft. = $1113.00
$1921.50
Replace every 1000 hours = $1921.50 ÷ 1000 = $1.92

VI Remarks - 1/ (Note: All costs are included in rental rates.)
Strawwire : 3000' of 3/8" @ $0.32/ft. = $960.00
Replace every 4000 hours = $960.00 ÷ 4000 = $0.24/hr.
Chokers: Use 3 chokers, 20' of 3/4" wire @ 24.59 ea.
Bantam choke hook 7.00 ea.
Total 31.59
Less deduction for recovery of 1/2 value of hooks $7.00 ÷ 2 = 3.50
$28.09
3 Chokers @ $28.09 = $84.27 ÷ 80 hour replace = $1.05

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. C-2

I Description Yarder- Portable 90' tower, Berger ME Standard yarder. Portable tower trailer mounted with associated heavy rigging (exterior rigging)

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 21.35 /hr.	$ _____ /hr.
B. Operating	$ 19.24 /hr.	$ _____ /hr.
Total	$ 40.59 /hr.	$ _____ /hr.
.....	$ 0.677 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 301,766

Attachments Radio 3 180

Total $ 304,946

B. Residual Value (total) ..... $ 42,703

Yarder-trailer based on 15 % of investment.

for 16,000 hrs. of (useful life-first depreciable period)

Rigging based on 0 % of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value)$ 262,243

D. Average Annual Investment .....$ 186,937 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 21.35/hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ 16.39

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 2.04
Annual Cost of $ 3271.40 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 2.92
Annual Cost of $ 4673.42 .

V. Operating Cost (per hour of operation) ..... $ 19.24

A. Fuel (diesel - gas) .....$ 2.70 /hr.

6 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.41 /hr. (15% of fuel cost)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 8.20 /hr.
50 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify) Wire rope:
Mainline: 1400' of 1 1/4" @ 1.62 / ft., replace @ 1000 hrs: $2.27/hour
Haulback: 3500' of 7/8" @ $0.98/ft. replace @ 2000 hours: $1.72/hour

VI Remarks - 1/ (Note: All costs are included in rental rates.)
Strawline: 3400' of 7/16" @ $0.39/ft., replace @ 8,000 hrs.: $0.17/hour
Chokers: (Use 4 chokers)
36' x 1" @ $ 50.67 ea.
Light Jr. Choker Hook @ $ 10.18 ea.
2 U 9 Ferrules 19.72 ea.
Total $80.57 - Deduction for recovery = 1/2 value hook = 5.09 = $75.48
$75.48 x 4 = 301.92 ; replace @ 80 hours = $ 3.77

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. C-3

I Description Yarder - Portable 110' tower. Skagit BU 98 Yarder, T-110 tower. Associated heavy rigging.

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 41.31 /hr.	$ _____ /hr.
B. Operating	$ 29.16 /hr.	$ _____ /hr.
Total	$ 70.47 /hr.	$ _____ /hr.
.....	$ 1.175 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 226,734
Radio 7,950
Attachments Trailer mtd. tower 335,119
Associated rigging 18,020
Total $ 587,823

B. Residual Value (total) ..... $ 79,507

Yarder/Tower based on 15 % of investment.

for 16,000 hrs. of (useful life-first depreciable period)

Rigging & radio based on 0 % of investment.

for 16,000 hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 508,316

D. Average Annual Investment ..... $ 359,081 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 41.31 /hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ 31.77

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 3.93
Annual Cost of $ 6283.92.

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 5.61
Annual Cost of $ 8977.03.

V. Operating Cost (per hour of operation) ..... $ 29.16

A. Fuel (diesel - gas) .....$ 4.50 /hr.

10 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.68 /hr. (15% of fuel cost)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 15.89 /hr.
50 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify) Mainline: 1500' of 1⅛" @ $1.62/ft. = $2432.70
Haulback: 3500' of 7/8" @ $0.984/ft = 3442.88
Strawline: 3500' of 7/16" @ 0.391ft = 1365.28
Replace mainline @ 1000hrs or 2432.70 ÷ 1000 = 2.43/hour

VI Remarks - 1/ (Note: All costs are included in rental rates.)
Replace haul back @ 2000 hours or 3442.88 ÷ 2000 = 1.72/hr.
Replace strawline @ 8000 hours or 1365.28 ÷ 8000 = 0.17/hr.
Chokers: (Use 4)
36'x 1" @ $50.67 = 50.67
Light Dr. Choker hook = 10.18
2 U 9 ferrules 19.72
80.75
Deduction for recovery of ½ value of choker hook
80.57 - 5.09 = 75.48 x 4 = 301.92, replace @ 80 hrs
or 301.92 ÷ 80 = $ 3.77/hr.

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. C-4

I Description Static Skyline - Portable 110' tower Skagit BU98 yarder T-110' tower & Rec-15 Skycar (radio controlled) - Skyline single drum and associated heavy rigging

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 77.96 /hr.	$ _____ /hr.
B. Operating	$ 54.70 /hr.	$ _____ /hr.
Total	$ 132.66 /hr.	$ _____ /hr.
.....	$ 2.211 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine	$ 607 910
Skycar Rec-15 & drum	160 060
Attachments Radio	7 950
TOTAL	$ 775,920

B. Residual Value (total) ..... $ 93,025

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 682,895

D. Average Annual Investment .....$ 486,207 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 77.96 /hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ 65.04

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 5.32
Annual Cost of $ 3509.62 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 7.60
Annual Cost of $ 12,155.18 .

V. Operating Cost (per hour of operation) ..... $ 54.70

A. Fuel (diesel - gas) .....$ 4.50 /hr.

10 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.68 /hr. (15% of fuel costs)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 31.22 /hr.
48 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)
Rigging Cost: $18.60/hour

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. C-5

I Description Mobile Yarder - Loader, Skagit SJ-5R (used), rubber tired carrier, standard outrigging. "Ready to log"

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 12.83 /hr.	$ _____ /hr.
B. Operating	$ 11.75 /hr.	$ _____ /hr.
Total	$ _____ /hr.	$ _____ /hr.
.....	$ _____ /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 90,100

Attachments Associated rigging & radio 8,480

Total $ 98,580

B. Residual Value (total) ..... $ 8,500

Basic machine based on 10 % of investment.

for 8000 hrs. of (useful life-first depreciable period)

Rigging & radio based on 0 % of investment.

for 8 000 hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 90,080

D. Average Annual Investment ..... $ 61,990 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 12.83 /hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ 11.26

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 0.65
Annual Cost of $ 1035.97 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 0.92
Annual Cost of $ 1479.95.

V. Operating Cost (per hour of operation) ..... $ 11.75

A. Fuel (diesel - gas) .....$ 2.93 /hr.

6.5 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.44 /hr. (15 % of fuel costs)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 5.63 /hr.
50 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify) Wire Rope
Mainline: 700'of 1" @ $1.42 = 994.24, replace @ 800 hrs = 1.24/hr.
Haulback: 1630'of 5/8"@ $0.621=1012.49, replace@ 1500 hrs.= 0.67/hr.
Strawline: 2050'of 5/16"@ $0.349= 717.09 , replace@ 3000 hrs = 0.24/hr.
Total $ 2.15/hr.

VI Remarks - 1/ (Note: All costs are included in rental rates.)
Chokers: (use 2 chokers)
20' x 3/4" = $24.59
Hooks, light = $ 10.60
$35.19
Deduction for recovery of ½ value of hooks =
$35.19 - 5.30 = 29.89 x 2 = $59.78, replace@
100 hours or 59.78 ÷ 100 = $0.60/hour

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. d-1

I Description Light mobile hydraulic log loader Barko Model 160, mounted on a used logging truck

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ 4.62 /hr.	$ _____ /hr.
B. Operating	$ 4.58 /hr.	$ _____ /hr.
Total	$ 9.20 /hr.	$ _____ /hr.
.....	$ 0.153 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 34980

Attachments Used truck & install. 10070

Total $ 45,050

B. Residual Value (total) ..... $ 6,600

Truck & loader based on _____ % of investment.

for 10,000 hrs. of (useful life-first depreciable period)

_____ based on _____ % of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 38450

D. Average Annual Investment .....$ 28901 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 4.62 /hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ 3.85

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 0.32
Annual Cost of $ 505.77 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 0.45
Annual Cost of $ 722.53 .

V. Operating Cost (per hour of operation) ..... $ 4.58

A. Fuel (diesel - gas) .....$ 2.25 /hr.

5 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.34 /hr. (15% of fuel cost)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 1.92 /hr.
50 % of depreciation

D. Tires ..... $ 0.073 /hr.
$ 725.60 total cost @ " 10,000 " hrs. of tire life.

E. Other (specify)
Tires: Used, 1 set recaps = 72.56 / tire x 10 =
$ 725.60 . $ 725.60 ÷ 10,000 = $ .073 / hour

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. d-2

I Description Heavy Mobile Hydraulic Log Loader - Barko 450 Track Loader 60" Grapple, Self Contained Carrier

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 9.72 /hr.	$ _____ /hr.
B. Operating	$ 6.94 /hr.	$ _____ /hr.
Total	$ 16.66 /hr.	$ _____ /hr.
.....	$ .278 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 140,980

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ 26,600

Total Machine based on 20 % of investment.

for 16,000 hrs. of (useful life-~~first depreciable period~~)

_____ based on _____ % of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 114,380

D. Average Annual Investment ..... $ 89,509 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 9.72 /hr.
(based on 1,600 hours of annual machine availability)

A. Depreciation ..... $ 7.15

B. Insurance (rate 1.75 % of ave. ann. invest.) $ .98
Annual Cost of $ 1566.

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 1.40
Annual Cost of $ 2238.

V. Operating Cost (per hour of operation) ..... $ 6.94

A. Fuel (diesel - gas) .....$ 2.93 /hr.

6.5 gal. per hour for $ .45 per gal.

B. Oil and Grease .....$ .44 /hr. (15% of Fuel Cost)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 3.58 /hr.
50 % of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. d-3

I Description Heavy mobile log loader - Barko 450, rubber tired, 60" grapple, self contained, mounted on a Pierce carrier, 3 axle machine.

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 10.38 /hr.	$ _____ /hr.
B. Operating	$ 7.48 /hr.	$ _____ /hr.
Total	$ 17.86 /hr.	$ _____ /hr.
.....	$ 0.298 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 153,700

Attachments _____

Total $ 153,700

B. Residual Value (total) ..... $ 29,000

Total machine based on 20 % of investment.

for 16,000 hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 124,700

D. Average Annual Investment .....$ 97,585 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 10.38 /hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ 7.79

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 1.07
Annual Cost of $ 1707.74 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 1.52
Annual Cost of $ 2439.63 .

V. Operating Cost (per hour of operation) ..... $ 7.48

A. Fuel (diesel - gas) .....$ 2.93 /hr.

6.5 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.44 /hr. (15% of fuel costs)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 3.90 /hr.
50 % of depreciation

D. Tires ..... $ 0.21 /hr.
$ 3434 total cost @ "16000 " hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

Driver tires: 1200x20 - 16ply - 1 complete set = 8 tires per set. Tire price discounted includes tax. Tire = 318.00, Tube = 31.80. Total = 349.80 x 8 = $2,798.40.

Front tires: 15.00 x 22.5 - 16 ply tubeless. 1 complete set = 2 tires/set. Tire price discounted includes tax. Tire = $ 318.00 x 2 = $636.00

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. d-4

I Description Front End Log Loader - Rubber Tired - Cat 966C, 170 H.P., Powershift, Hydro Log Fork Lift, All Weather Cab - Equipped For Logging

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 6.14 /hr.	$ _____ /hr.
B. Operating	$ 8.74 /hr.	$ _____ /hr.
Total	$ 14.88 /hr.	$ _____ /hr.
.....	$ .248 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 90,931.04

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ 17,157

Total Machine based on 20 % of investment.

for 16,000 hrs. of (useful life-first depreciable period)

_____ based on _____ % of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 73,774.04

D. Average Annual Investment ..... $ 57,733.00 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 6.14 /hr.
(based on 1,600 hours of annual machine availability)

A. Depreciation ..... $ 4.61

B. Insurance (rate 1.75 % of ave. ann. invest.) $ 0.63
Annual Cost of $1,010.32 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ 0.90
Annual Cost of $ 1443.33 .

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ 2.79 /hr.

6.2 gal. per hour for $ 0.45 per gal.

B. Oil and Grease .....$ 0.44 /hr.
Lube oil - Crankcase .10 gph @ $ 2.17 per gal.
Trans. & Drive .04gph @ $ 2.17 per gal.
Hyd. Oil .04gph @ $ 2.16 per gal.
Grease .04lbs. per hr. @ $ 0.44 per lbs.
Filters $.065 per hr.

C. Repairs and Maintenance ..... $ 4.15 /hr.
90 % of depreciation

D. Tires ..... $ 1.36 /hr.
$21,700.32 total cost @ "16,000" hrs. of tire life.

E. Other (specify) Tires: 23.5x25 (16 ply) = $ 1355.74 ea.
2 sets of 4 @ 1355.74 = $ 10,845.92
Recaps: 4 sets of 4 @ $ 678.40/tire = $ 10,854.40
Total = $ 21,700.32

VI Remarks - 1/ (Note: All costs are included in rental rates.)

$ 21,700.32 / 16,000 hrs = $ 1.36/hr.

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. e-1

I Description Drill and Air Compressor - Hand-held Drill, 150-215 CFM Compressor, 100' of 3/4" Hose with Coupling (Compressor, steel & bits)

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ _____/hr.	$ 7.59 /hr.
B. Operating	$ _____/hr.	$ 3.60 /hr.
Total	$ _____/hr.	$ 11.19 /hr.
.....	$ _____/min.	$ .187 /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. e-2

I Description Track Drill and Air Compressor - 600 CFM Compressor, Including pipe, Hose and Fitting.

II Rate

	Ownership	Rental 1/
A. Fixed ... $	_____/hr.	$ 52.50/hr.
B. Operating $	_____/hr. Steel & Bits	$ 2.96 / 9.45/hr.
Total ..... $	_____/hr.	$ 64.91/hr.
..... $	_____/min.	$ 1.082/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. f-1

I Description Motor Scraper - Caterpillar, Non-Custom Hitch, Power Shift, 14-20 Cubic Yard Capacity, 300 H.P.

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ _____/hr.	$ 62.40/hr.
B. Operating	$ _____/hr.	$ 13.00/hr.
Total	$ _____/hr.	$ 75.40/hr.
.....	$ _____/min.	$ 1.257/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. 9-1

I Description Shovel - Mechanical, Crawler Mounted, 3/4 Cubic Yard

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ _____/hr.	$ 27.52/hr.
B. Operating	$ _____/hr.	$ 7.90/hr.
Total	$ _____/hr.	$ 35.42/hr.
.....	$ _____/min.	$ .590/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. h-1

I Description Front End Loader (Bucket) Caterpillar 950 (81J), 2½ Cubic Yard, Rubber Tired

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ _____/hr.	$ 37.60/hr.
B. Operating	$ _____/hr.	$ 7.95/hr.
Total	$ _____/hr.	$ 45.55/hr.
.....	$ _____/min.	$ .759/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. 1-1

I Description Vibratory Roller, Pull Type - Hyster - 200 - B, 31 H.P.

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ _____/hr.	$ 22.53/hr.
B. Operating	$ _____/hr.	$ 2.15/hr.
Total	$ _____/hr.	$ 24.68/hr.
.....	$ _____/min.	$ .411/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. A-2

I Description Road Roller - Grid, 16 Ton, Hyster Model, Single Drum

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ _____/hr.	$ 12.46/hr.
B. Operating	$ _____/hr.	$ 1.20/hr.
Total	$ _____/hr.	$ 13.66/hr.
.....	$ _____/min.	$ .228/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. j-1

I Description Grader - Caterpillar 14E (726), Power Shift, Diesel Power

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ _____/hr.	$ 29.95/hr.
B. Operating	$ _____/hr.	$ 8.95 /hr.
Total	$ _____/hr.	$ 3890 /hr.
.....	$ _____/min.	$ .648 /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value)$ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. j-2

I Description Motor Grader - Caterpillar No. 12 FW/ Cat Complete, Hydraulic Sideshift, Molding Board Scarifier, Lights and Heavy Duty Cutting Edge

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ 4.91 /hr.	$ _____/hr.
B. Operating	$ 5.54 /hr.	$ _____/hr.
Total	$ 10.45 /hr.	$ _____/hr.
.....	$ .174 /min.	$ _____/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 75,481.00

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ 17,802.00

Total Machine based on 25 % of investment.

for 16,000 hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 57,679.00

D. Average Annual Investment ..... $ 49,312.00 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 4.91 /hr.
(based on 1,600 hours of annual machine availability)

A. Depreciation ..... $ 3.60

B. Insurance (rate 1.75 % of ave. ann. invest.) $ .54
Annual Cost of $ 862.96 .

C. Property Taxes (rate 2.5 % of ave.ann.invest.)$ .77
Annual Cost of $ 1232.80 .

V. Operating Cost (per hour of operation) ..... $ 5.54

A. Fuel (diesel - gas) .....$ 2.07 /hr.

4.6 gal. per hour for $ .45 per gal.

B. Oil and Grease .....$ .31 /hr. (15% of Fuel Costs)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 2.16 /hr.
60 % of depreciation

D. Tires ..... $ .44 /hr.
$ 6963.60 total cost @ "16,000 " hrs. of tire life.

E. Other (specify) Replace Tires Every 2 Years

Rear New 13x24 (12 Ply)		Front Recapped	
Tire	247.41	Tire	97.52
Tube	27.78	Tube	27.78
Tax	9.42	Tax	1.81
	284.63 x 20 Tires = 5692.60		127.11 x 10 Tires = 1271.00

VI Remarks - 1/ (Note: All costs are included in rental rates.)

End Bits	2 @	16.07	= 32.14
Overlays	2 @	40.46	= 80.92
Cutting Edges	2 @	52.61	= 105.22
Scarifier Tip	11 @	5.59	= 61.49
			279.77 Replace Every 500 hrs.
			÷ 500
			.56 / hr.

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. K-1

I Description Dump Truck - 6x4 Tri-Axle, 12 Cubic Yard, Gasoline Power, On/Off Highway, Rear Dump

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ _____/hr.	$ 24.04/hr.
B. Operating	$ _____/hr.	$ 13.45/hr.
Total	$ _____/hr.	$ 37.49/hr.
.....	$ _____/min.	$ .625/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease ___ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. 1-1

I Description Lowbed Trailer with Tractor, 3 Axle Trailer, 65-90,000 Gross Vehicle Weight, 240 H.P., Diesel Engine

II Rate

	Ownership	Rental[1/]
A. Fixed ...	$ _____/hr.	$ 33.82/hr.
B. Operating	$ _____/hr.	$ 6.75/hr.
Total	$ _____/hr.	$ 40.57/hr.
.....	$ _____/min.	$ .676/min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ _____

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ _____

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ _____

D. Average Annual Investment .....$ _____/yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ _____/hr.
(based on _____hours of annual machine availability)

A. Depreciation ..... $ _____

B. Insurance (rate _____% of ave. ann. invest.) $ _____
Annual Cost of $ _____.

C. Property Taxes (rate _____% of ave.ann.invest.)$ _____
Annual Cost of $ _____.

V. Operating Cost (per hour of operation) ..... $ _____

A. Fuel (diesel - gas) .....$ _____/hr.

_____ gal. per hour for $ _____per gal.

B. Oil and Grease .....$ _____/hr.
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ _____/hr.
_____% of depreciation

D. Tires ..... $ _____/hr.
$ _____total cost @ "_____" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. m-1

I Description Log Truck with Trailer - White Western Star Model 4964, Peerless Trailer, 350 H.P., Cummins Diesel - With All Equipment for Safe Operation & Ready to Haul

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ 6.25 /hr.	$ _____ /hr.
B. Operating	$ 10.83 /hr.	$ _____ /hr.
Total	$ 17.08 /hr.	$ _____ /hr.
.....	$ .285 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 59572.00

Attachments (See Above)

_____ $ _____

B. Residual Value (total) ..... $ 10050.00

Truck & Trailer based on 25 % of investment.

for 10,000 hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value)$ 45,522.00

D. Average Annual Investment .....$ 41,363.00 /yr.

'9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ 6.25 /hr.
(based on 2,000 hours of annual machine availability)

A. Depreciation ..... $ 4.55

B. Insurance (rate _____% of ave. ann. invest.) $ .95
Annual Cost of $ 1892.56 .(Commercial Truck Rate)

V C. DMV Fees ~~Property Taxes~~ (rate _____% of ave.ann.invest.)$ .75
Annual Cost of $ 1494.00 .

V. Operating Cost (per hour of operation) ..... $ 10.83

A. Fuel (diesel - gas) .....$ 3.44 /hr.

6.5 gal. per hour for $ .53 per gal. 75% "on Highway 25% "off Highway

B. Oil and Grease .....$ .172 /hr. (5% of Fuel Cost)
Lube oil - Crankcase ___gph @ $ _____per gal.
Trans. & Drive ___gph @ $ _____per gal.
Hyd. Oil ___gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ 4.55 /hr.
100 % of depreciation

D. Tires ..... $ 2.67 /hr.
$ 26,741.00 total cost @ "10,000 " hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

V License Fees

Truck

Registration	11.00
License	241.00
Weight Fee	247.00
PUC	500.00
	999.00

Trailer

Weight Fee	413.00
License	71.00
Registration	11.00
	495.00

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. A-1

I Description Crew Car
GMC, 3/4 Ton, 9 Passenger Carryall,
" Complete

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ .97 /hr.	$ _____ /hr.
B. Operating	$ 3.32 /hr.	$ _____ /hr.
Total	$ 4.29 /hr.	$ _____ /hr.
.....	$ .072 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 8586.00

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ 1620.00

Total based on 20 % of investment.

for 10000 hrs. of (useful life-first depreciable period)

_____ based on _____% of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 6966.00

D. Average Annual Investment .....$ 5660.28 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ .97 /hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ .697

1/ B. Insurance (rate _____% of ave. ann. invest.) $ .218
Annual Cost of $ 349.00 .

C. DMV Fees
~~Property Taxes~~ (rate _____% of ave.ann.invest.)$ .06
Annual Cost of $ 91.00 .

V. Operating Cost (per hour of operation) ..... $ 3.32

A. Fuel (diesel - gas) .....$ 2.25 /hr.

3.75 gal. per hour for $ .60 per gal.

B. Oil and Grease .....$ .34 /hr. (15% of Fuel Cost)
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ .583 /hr.
90 % of depreciation

D. Tires ..... $ .147 /hr.
$ 1560.32 total cost @ "10000 " hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

1/ Liability #149.00
Collision 150.00
Comprehensive 50.00
349.00

9353.3 - PRODUCTION COSTS

Machine Operating Rates

Item No. n-1

I Description Crew Car
GMC, 3/4 Ton, 9 Passenger Carryall,
" Complete

II Rate

	Ownership	Rental 1/
A. Fixed ...	$ .97 /hr.	$ _____ /hr.
B. Operating	$ 3.32 /hr.	$ _____ /hr.
Total	$ 4.29 /hr.	$ _____ /hr.
.....	$ .072 /min.	$ _____ /min.

1/ Based on schedule _____

III Investment

A. Acquisition (freight included)

Basic Machine ..... $ 8586.00

Attachments _____

_____ $ _____

B. Residual Value (total) ..... $ 1620.00

Total based on 20 % of investment.

for 10000 hrs. of (useful life-first depreciable period)

_____ based on _____ % of investment.

for _____ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) $ 6966.00

D. Average Annual Investment .....$ 5660.28 /yr.

9353.3 - PRODUCTION COSTS

IV Fixed Cost (per hour of availability .....$ .97 /hr.
(based on 1600 hours of annual machine availability)

A. Depreciation ..... $ .697

1/ B. Insurance (rate _____% of ave. ann. invest.) $ .218
Annual Cost of $ 349.00 .

C. ~~Property Taxes~~ DMV Fees (rate _____% of ave.ann.invest.)$ .06
Annual Cost of $ 91.00 .

V. Operating Cost (per hour of operation) ..... $ 3.32

A. Fuel (diesel - gas) .....$ 2.25 /hr.

3.75 gal. per hour for $ .60 per gal.

B. Oil and Grease .....$ .34 /hr. (15% of Fuel Cost)
Lube oil - Crankcase ____gph @ $ _____per gal.
Trans. & Drive ____gph @ $ _____per gal.
Hyd. Oil ____gph @ $ _____per gal.
Grease __ lbs. per hr. @ $ _____per lbs.
Filters $ _____ per hr.

C. Repairs and Maintenance ..... $ .583 /hr.
90 % of depreciation

D. Tires ..... $ .147 /hr.
$ 1560.32 total cost @ "10000 " hrs. of tire life.

E. Other (specify)

VI Remarks - 1/ (Note: All costs are included in rental rates.)

1/ Liability #149.00
Collision 150.00
Comprehensive 50.00
349.00

9353.3 - PRODUCTION COSTS

(Schedule 4)

C. Operating Costs

1. Procedure. The costs of various segments of each operation are combined to determine the total costs of performing this function. The fixed and operating costs for rented machines are included. The wages for each employee contributing to the operation are added, along with the additonal labor-related cost and cost of transportation to the job. In addition, ten per cent of the total of all the costs is included to cover general and administrative costs, i.e., the costs of clerical work, accounting services, administration and overhead, etc.

2. Operating Cost Computations. The individual computations are summarized below. They are grouped by the major functions, and referenced to specific cost tables in the schedule.

9353.3-PRODUCTION COSTS (C2a1)
SCHEDULE 4
Operating Cost Computations

Activity- FALLING AND BUCKING

Operations- MERCHANTABLE AND UNMERCHANTABLE TREES

Reference for Cost Table Illustration Table 1 & 2

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Chain saw	0.41	1.09	1.50
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 1.50

	Hour Rate	Total
B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time		
1. Faller-Bucker	$16.42	$16.42
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 16.42

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 17.92 x 10%..... $ 1.79

D. Total Costs ..... $ 19.71

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ _____

Per Hour $ 19.71

Per Minute $ 0.329

Remarks:

9353.3-PRODUCTION COSTS (C2a2)
SCHEDULE 4
Operating Cost Computations

Activity- FALLING AND BUCKING

Operations- COMMERCIAL THINNING

Reference for Cost Table Illustration Table 3

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Chain Saw	0.41	1.09	1.50
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 1.50

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Falling and Bucking Labor Cost	$13.5	$13.57
2. Use average wage in lieu of		
3. wages in other F&B costs		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 13.57

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 15.07 x 10%..... $ 1.51

D. Total Costs ..... $ 16.58

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ _____

Per Hour $ 16.58

Per Minute $ 0.2762

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN FOR (2) YARDING TRACTORS

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Tractor Cat D7G 2 hour delay 48,000 lbs	2x13.30		26.60
2. Flag Car - Use Crew truck as car 2 cars for 2 hours each	4x0.97	4x3.32	17.16
3. State Highway Permit (Required for each move)	3.00		3.00
4. Lowbed and Tractor 4 hours (rental)	4x33.82	4x6.75	162.28
5.			
6.			
Total Machine Rate.....			$ 209.04

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Tractor Operator	2x14.73	29.46
2. Driver for lowbed *	4x11.35	45.40
3. Driver For crew car (flag car) *	4x11.35	45.40

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. * Use Log Truck Drivers wage
5. rate
6.
7.
8.

Total Wage Rate.....$ 120.26

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 329.30 x 10%..... $ 32.93

D. Total Costs ..... $ 362.23

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 362.23

Per Hour $

Per Minute $

Remarks:

9353.3-PRODUCTION COSTS (C261)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING, AND LOADING

Operations- EQUIPMENT MOVE IN - YARDING TRACTOR FMC 210CA

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Tractor FMC 210CA 2 hour delay	2x14.25		28.50
2. Lowbed trailer w/tractor (Rental) - "in and out" 4 hours	4x33.82	4x6.75	162.28
3. State Highway Permit	3.00		3.00
4.			
5.			
6.			

Total Machine Rate..... $ 193.78

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator	2x14.73	29.46
2. Driver for Lowboy (Log	4x11.35	45.40
3. truck driver rate)		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 74.86

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 268.64 x 10%..... $ 26.864

D. Total Costs ..... $ 295.50

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 295.50

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN, SMALL YARDER

WASHINGTON 78A SKYLOCK YARDER W/SWING BOOM-TRACK

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Small track yarder 78A 4 hour delay	4x22.57		90.28
2. Lowbed trailer w/tractor (Rental) 4 hours round trip	4x33.82	4x6.75	162.28
3. Crew Truck used as Flag Car - Driven by Yarding Engineer	4x0.97	4x3.32	17.16
4.			
5.			
6.			

Total Machine Rate..... $ 269.72

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Yarding Engineer	4x13.29	53.16
2. Log Truck Driver for Lowbed	8x11.35	90.80
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 143.90

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 413.62 x 10%..... $ 41.362

D. Total Costs ..... $ 454.98

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 454.98

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b1)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN 90' PORTABLE TOWER YARDER

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Tower-yarder w/90' Tower 4 hour delay	4x21.35		85.40
2. Logging truck and trailer for hauling 2hour delay & machine time.	4x6.25	2x10.93	46.66
3. State Highway Permit	3.00		3.00
4. Crew car - used for flag car 2 cars 2 hours delay and machine time	8x0.97	4x3.32	21.04
5.			
6.			
Total Machine Rate.....			$ 156.10

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Yarder Engineer	4x13.29	53.16
2. Log Truck Driver	4x11.35	45.40
3. Driver Crew Car (Log Truck driver rate)	8x11.35	90.80

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 189.36

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 345.46 x 10%..... $ 34.546

D. Total Costs ..... $ 380.01

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 380.01

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C261)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN 110' PORTABLE TOWER-YARDER

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

		Fixed	Operating	Total
A. Machine Rates Machine/Time				
1.	110' Tower-Yarder 4 hour delay	4x41.31		165.24
2.	Logging truck and trailer for hauling tower. 2 hour delay and machine rate.	4x6.25	2x10.83	46.66
3.	Crew trucks used as Flag cars 2 hour delay and machine rate 4 cars used.	16x0.97	8x3.32	42.08
4.	Lowbed & tractor for hauling yarder (Rental) 2 hour delay and 4 hours operating time	6x33.82	4x6.75	229.92
5.				
6.				

Total Machine Rate..... $ 483.90

		Hour Rate	Total
A. Wage Rates (Adjusted Hourly Rate) Crew Position/Time			
1.	Yarding Engineer	4x13.29	53.16
2.	Log Truck Driver (Tower)	4x11.35	45.40
3.	Log Truck Driver (Lowbed)	6x11.35	68.10

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Flag Car Drivers * 12 x 11.35 136.20
5. _____
6. _____
7. _____
8. _____

Total Wage Rate.....$ 302.86

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 786.76 x 10%..... $ 78.676

D. Total Costs ..... $ 865.44

II Misc. Add'l Costs/Adjustments

* Assumes one car driven by Yarding Engineer-
Paid at Log Truck Drivers rate.

III Operating Cost

Total ..... $ 865.44

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C261)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN PORTABLE 110' TOWER, STATIC SKYLINE - TOWER YARDER SIDE

Reference for Cost Table Illustration 2, Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 110' Tower-yarder-Sky Car, Small drum 250,000 lbs. 9 hours delay	9x77.97		701.64
2. Lowbed trailer w/ tract- or (Rental) 4 carriers at 6 hours/carrier round trip	24x33.82	24x6.75	973.68
3. 2 Crew Trucks used as Flag Car at 4 hours machine rate - 2 cars per carrier	32x0.97	32x3.32	137.28
4.			
5.			
6.			
Total Machine Rate.....			$ 1812.60

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Yarding Engineer	8x13.29	106.32
2. Loading Engineer	8x14.00	112.00
3. Tractor Operator	8x14.73	117.84

9353.3-PRODUCTION COSTS
SCHEDULE 4

4.	Chaser	6 x 12.32	73.92
5.	Drivers (Lowbeds)	24 x 11.35	272.40
6.	Drivers (Flag cars) *	16 x 12.32	197.12
7.			
8.			

Total Wage Rate.....$ 879.60

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 2692.20 x 10%..... $ 269.22

D. Total Costs ..... $ 2961.42

II Misc. Add'l Costs/Adjustments

* Driven by Chaser, Yarding Engineer, Loading Engineer, and Tractor Operator (4 cars)

Note: Appraiser should make allowances for the following associated equipment: Yarding Cat D7G and Mobile Log Loader Barko 450 (Track).

III Operating Cost

Total ..... $ 2961.42

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C261)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN LIGHT YARDING TRACTOR

Reference for Cost Table Illustration 2 Table 1
I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Tractor Cat. D4D 2 hr. Delay	2x5.19		10.38
2. Flat bed Trailer Pulled by Log Truck 3 hrs. (See Remarks on Next Page)	3x6.25	3x10.83	43.44
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 43.44

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Small Tractor Operater (Operates Truck and Tractor)	3x14.17	42.51
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 42.51

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 85.95 x 10%..... $ 8.60

D. Total Costs ..... $ 94.55

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks: A flatbed trailer, suitable for hauling a D-4 cat., represents a minimal investment. Log truck rates were used to move-in a D-4 cat.

9353.3-PRODUCTION COSTS (C261)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN MOBILE YARDER-LOADER

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Yarder-Loader S/J-SR (Used Equipment) 4 hours machine time	4x12.83	4x11.75	98.32
2. Crew Car-used as Flag Car 2 cars	8x0.97	8x3.32	34.32
3.			
4.			
5.			
6.			

Total Machine Rate..... $

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Yarding Engineer	4x13.29	53.16
2. Drivers-Flag cars *	8x12.32	98.56
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 106.32

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 238.96 x 10%..... $ 23.896

D. Total Costs ..... $ 262.86

II Misc. Add'l Costs/Adjustments

* Paid at Chaser rate

III Operating Cost

Total ..... $ 262.86

Per Hour $ _____

Per Minute $ _____

Remarks:

FEES-B-PRODUCTION COSTS (C2b1)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING, AND LOADING

Operations- EQUIPMENT MOVE-IN LIGHT MOBILE LOG LOADER

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Loader Barko Model 2x4.62 160 mounted on used logging truck - Delay 2 hours			9.24
2. Loader carrier operating as a log truck for hauling - Operating time - 2 hours		2x 9.20	18.40
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 27.64

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Log Truck Driver (2 hours)	2x11.35	22.70
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 22.70

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 50.34 x 10%..... $ 5.03

D. Total Costs ..... $ 55.37

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 55.37

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C261)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN HEAVY MOBILE LOG LOADER (RUBBER TIRED)

Reference for Cost Table Illustration 2 Table 1
I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Barko 450 Rubber Tired 6x10.38 60" Grapple - Self contained carrier - 6 hours machine time		6x7.48	107.16
2. On Highway Permit	3.00		3.00
3. Crew Car (Flag cars) 2 cars, 6 hours machine rate *	12x0.97	12x3.32	51.48
4.			
5.			
6.			
Total Machine Rate.....			$ 161.64

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Loading Engineer	6x14.00	$84.00
2. Chaser	6x12.32	$73.92
3. Flag Car Driver *	6x12.32	$73.92

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 231.84

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 393.48 x 10%..... $ 39.348

D. Total Costs ..... $ 432.83

II Misc. Add'l Costs/Adjustments

* One Flag Car driven by Chaser, other driver paid at chaser rate

III Operating Cost

Total ..... $ 432.83

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b 1)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN HEAVY MOBILE LOG LOADER (TRACKED)

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Barko 450 Tracked Loader Self contained carrier 4 hours machine time. 60" grapple	4x9.72	4x6.94	66.64
2. Lowbed and Tractor (rental) - 6 hours round trip.	6x33.82	6x6.75	243.42
3. Crew Trucks (2) used as Flag Cars 2 hours each	4x0.97	4x3.32	17.16
4.			
5.			
6.			
Total Machine Rate.....			$ 327.22

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Loading Engineer *	4x14.00	56.00
2. Chaser *	4x13.32	53.28
3. Lowbed Driver (Log Truck Driver rate)	6x11.35	68.10

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 177.38

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 504.60 x 10%..... $ 50.46

D. Total Costs ..... $ 555.06

II Misc. Add'l Costs/Adjustments

* Drive FlagCars as well as other regular duties

III Operating Cost

Total ..... $ 555.06

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING, AND LOADING

Operations- EQUIPMENT MOVE-IN RUBBER TIRED FRONT END LOADER

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Front end loader Cat 966C - 4 hours machine time	4x6.14	4x8.74	59.52
2. On highway permit	-	-	3.00
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 62.52

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator	4x 14.73	58.92
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 58.92

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 121.44 x 10%..... $ 12.144

D. Total Costs ..... $ 133.58

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 133.58

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C261)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- EQUIPMENT MOVE-IN RUBBER TIRED 4-WHEEL SKIDDER

Reference for Cost Table Illustration 2 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 4-wheel skidder-John Deere 440B 70 H.P.	3x4.57	3x6.02	31.77
2. State Highway Permit	3.00		3.00
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 34.77

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Tractor Operator (Small)	3x14.17	42.51
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 42.51

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 77.28 x 10%..... $ 7.728

D. Total Costs ..... $ 85.01

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 85.01

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C262)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- TRACTOR LOGGING - YARDING CAT D7G

Reference for Cost Table Illustration 2 Table 2,5,8&9

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 2 - Yarding Tractors Cat D7G - Machine Operating Rate	2x13.30	2x15.57	57.74
2. Chainsaw - Fixed cost/hour plus 3 hours/day operating	0.41	3/8x1.09	0.82
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 58.56

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. 2 - Tractor Operators (large)	2x 14.73	29.46
2. 2 - Choker Setters	2x 11.44	22.88
3. 1 - Chaser	12.32	12.32

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 64.66

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 123.22 x 10%..... $ 12.322

D. Total Costs ..... $ 135.542

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 135.54

Per Hour $ 135.54

Per Minute $ 2.259

Remarks:

9353.3-PRODUCTION COSTS (C262)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING, AND LOADING

Operations- TRACTOR LOGGING - YARDING - FMC 210CA "LOW GROUND PRESSURE TRACTOR"

Reference for Cost Table Illustration 2 Table 13,14,16-19

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 2-Yarding Tractors FMC 210 CA	2x14.25	2x18.48	65.46
2. Chainsaw Fixed cost/hour plus 3 hours/day operation	0.41	3/8x1.09	0.82
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 66.28

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. 2-Tractor Operators	2x14.73	29.46
2. 2-Choker Setters	2x11.44	22.88
3. 1-Chaser	12.32	12.32

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 64.66

C. General and Administrative Costs
10% of Machine and Wage Rates

$130.94 x 10%..... $ 13.094

D. Total Costs ..... $ 144.034

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 144.03

Per Hour $ 144.03

Per Minute $ 2.401 (2-tractors)
1.200 (1-tractor)

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- TRACTOR LOGGING - LOADING W/TRACK LOADER

Reference for Cost Table Illustration 2 Table 3,6,9,11,13,15-17, 20&21

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	Heavy mobile loader Barko 450 track loader Fixed cost/hour plus hourly operating rate at 75% 1/	9.72	.75x6.94	14.93
2.				
3.				
4.				
5.				
6.				

Total Machine Rate..... $ 14.93

	B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1.	Loading Engineer	14.00	14.00
2.			
3.			

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.00

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 28.93 x 10%..... $ 2.893

D. Total Costs ..... $ 31.823

I Misc. Add'l Costs/Adjustments

1/ Reduction of 25% reflects waiting time for yarding tractor and machine down time.

II Operating Cost

Total ..... $ 31.823

Per Hour $ 31.82

Per Minute $ 0.530

Remarks: 0.265 half loading cost for tractor yarding

9353.3-PRODUCTION COSTS (C2b4)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING & LOADING

Operations- TRACTOR LOGGING - SALVAGE PICKUP YARDING

Reference for Cost Table Illustration 2 Table 5

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	YARDING Tractor CAT. D7G MACHINE RATE	13.30	15.57	28.87
2.	CHAINSAW Fixed Cost/hr. plus 3 Hour per day operation	.41	3/8 X 1.09	.82
3.				
4.				
5.				
6.				

Total Machine Rate..... $ 29.69

	B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1.	Tractor Operator	14.73	14.73
2.	Choker Setter	11.44	11.44
3.			

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 26.17

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 55.86 x 10%..... $ 5.59

D. Total Costs ..... $ 61.45

II Misc. Add'l Costs/Adjustments

TABULAR ADJUSTMENT
Salvage Pickup Yarding Cost (one tractor) per minute
Tractor Logging Yarding Cost (one tractor) per minute
Adjustment
0.976 ÷ 1.084 = .900 Factor for Salvage Pickup

III Operating Cost

Total ..... $ _____

Per Hour $ 61.45

Per Minute $ 1.024

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- TRACTOR LOGGING - SALVAGE PICKUP LOADING

Reference for Cost Table Illustration 2 Table 6

I Determining Hourly Cost

		Fixed	Operating	Total
A. Machine Rates Machine/Time				
1.	Front End log loader Cat 966C Hourly operating rate at 75%	6.14	.75x8.74	12.70
2.	1/			
3.				
4.				
5.				
6.				

Total Machine Rate..... $ 12.70

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Front End Loader Operator	14.73	14.73
2. (Tractor Operator-Large)		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 14.73

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 27.43 x 10%..... $ 2.743

D. Total Costs ..... $ 30.173

II Misc. Add'l Costs/Adjustments

1/ Reduction of 25% reflects waiting time for yarding tractor and down time for machine

Tabular Adjustment

(1) Salvage pickup loading cost = 0.503/min.

(2) Tractor logging loading cost = 0.530/min

Adjustment: .503 ÷ .530 = .95

Apply to costs shown in "Loading-Partial cut Tractor Operations" and its adjustment table.

III Operating Cost

Total ..... $ 30.17

Per Hour $ 30.17

Per Minute $ 0.503

Remarks:

9353.3-PRODUCTION COSTS (C266)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- TRACTOR LOGGING, RIGGING COSTS FOR CLEARCUT AND PARTIAL CUT (1ST LANDING)

Reference for Cost Table Illustration 2 Table 10

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 2 Yarding tractors Cat D7G 2½ hours fixed cost	5x13.30		66.50
2. Chainsaw - 4 hours fixed cost	4x0.41		1.64
3. Mobile loader - Barko 450 (tracked) 1-hour machine cost	9.72	6.94	16.66
4. Yarding tractor Cat D7G 1 hour machine cost for landing const.	13.30	15.57	28.87
5.			
6.			
Total Machine Rate.....			$ 113.67

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. 2-Tractor Operators-3 hours	6x14.73	88.38
2. 2-Choker Setters - 4 hours	8x11.44	91.52
3. Chaser - 1 hour	12.32	12.32

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Loading Engineer - 1 hour 14.00 14.00
5. _____
6. _____
7. _____
8. _____

Total Wage Rate.....$ 206.22

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 319.89 x 10%..... $ 31.989

D. Total Costs ..... $ 351.88

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 351.88

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C266)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- TRACTOR LOGGING, RIGGING COST CLEARCUT AND PARTIAL CUT (ADDITIONAL LANDINGS)

Reference for Cost Table Illustration 2 Table 10

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 2-Yarding tractors Cat D7G 1/2 hour machine cost	13.30	15.57	28.87
2. Chainsaw 1/2 hour fixed cost	1/2 x 0.41		0.21
3. Mobile loader-Barko 450 (tracked) 1/2 hour fixed cost, 1/2 hour operating cost.	1/2 x 9.72	1/2 x 6.94	8.33
4. Yarding tractor Cat D7G, 1 hour machine cost for landing const.	13.30	15.57	28.87
5.			
6.			

Total Machine Rate..... $ 66.28

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. 2-Tractor Operators (1/2 hour)	14.73	14.73
2. 2-Choker Setters (1/2 hour)	11.44	11.44
3. Chaser (1/2 hour)	1/2 x 12.32	6.16

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Loading Engineer (½ hour) ½ x 14.00 7.00
5. _____
6. _____
7. _____
8. _____

Total Wage Rate.....$ 39.33

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 105.61 x 10%..... $ 10.561

D. Total Costs ..... $ 116.17

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 116.17

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C267)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- TRACTOR LOGGING - RIGGING COST
SALVAGE Pick up 1ST LANDING

Reference for Cost Table Illustration 2 Table 10

I Determining Hourly Cost

		Fixed	Operating	Total
A. Machine Rates Machine/Time				
1. YARDING TRACTOR CAT. D7G 2½ hrs. FIXED COST	2½ x 1330			3325
2. CHAINSAW 4 hrs. FIXED COST	4 x .41			1.64
3. FRONT END LOADER CAT 966C 1 hr. Machine Rate		6.14	8.74	14.88
4. YARDING TRACTOR CAT. D7G 1 hr. Machine Rate For Landing Construction		13.30	15.57	28.87
5.				
6.				

Total Machine Rate..... $ 78.64

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. TRACTOR OPERATOR (6 hrs.)	6 x 14.73	88.38
2. Choker Setter (6 hrs.)	6 x 11.44	68.64
3. Front End Loader Oper (3 hrs) (Tractor Oper. Large)	3 x 14.73	44.19

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 201.21

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 279.85 x 10%..... $ 27.99

D. Total Costs ..... $ 307.84

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- TRACTOR LOGGING - RIGGING COST
SALVAGE PICKUP ADDITIONAL LANDINGS

Reference for Cost Table Illustration 2 Table 10

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. YARDING TRACTOR D7G 2 hrs. Fixed Cost 2 hrs Operating Cost	2X13.30	2X15.57	57.74
2. CHAINSAW ½ hr. Fixed Cost	½X.41		.21
3. FRONT END LOG LOADER CAT. 966C ½ hr. Machine Cost	½X6.14	½X8.74	7.44
4.			
5.			
6.			
Total Machine Rate.....			$ 65.39

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Tractor Operator (1 hr.)	14.73	14.73
2. Choker Setter (1 hr.)	11.44	11.44
3. Front End Loader Oper. (Lrge. Trac. Oper.) (1 hr.)	14.73	14.73

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 40.90

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 106.29 x 10%..... $ 10.63

D. Total Costs ..... $ 116.92

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C268)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD LOGGING -- YARDING

WASHINGTON 78A, SKYLOCK YARDER, SWING BOOM

Reference for Cost Table Illustration 2 Table 22 & 23

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Washington 78A Yarder - Machine rate 1 hour	22.57	14.37	36.94
2. Chainsaw - Fixed cost per hour plus hourly rate of 3 hours per day.	0.41	3/8 x 1.09	0.82
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 37.76

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Hook Tender	14.92	14.92
2. Rigging Slinger	12.89	12.89
3. 2-Choker Setters	2 x 11.44	22.88

9353.3-PRODUCTION COSTS
SCHEDULE 4

4.	Chaser	12.32	12.32
5.	Yarding Engineer	13.29	13.29
6.			
7.			
8.			

Total Wage Rate.....$ 76.30

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 114.06 x 10%..... $ 11.406

D. Total Costs ..... $ 125.466

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 125.47

Per Hour $ 125.47

Per Minute $ 2.091

Remarks:

9353.3-PRODUCTION COSTS (C269)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD LOGGING - YARDING 90' TOWER

Reference for Cost Table Illustration 2 Table 26 & 27

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 90' Portable tower Berger yarder Machine rate	21.35	19.24	40.59
2. Chainsaw - Fixed cost per hour plus operating time at 3 hours/day	0.41	3/8 x 1.09	0.82
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 41.41

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Hooktender	14.92	14.92
2. Rigging Slinger	12.89	12.89
3. 2-Choker Setters	2 x 11.44	22.88

9353.3-PRODUCTION COSTS
SCHEDULE 4

4.	Chaser	12.32	12.32
5.	Yarding Engineer	13.29	13.29
6.			
7.			
8.			

Total Wage Rate.....$ 76.30

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 117.71 x 10%..... $ 11.771

D. Total Costs ..... $ 129.481

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 129.48

Per Hour $ 129.48

Per Minute $ 2.158

Remarks:

9353.3-PRODUCTION COSTS (C2b10)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD LOGGING - YARDING 110' TOWER

BU 98

Reference for Cost Table Illustration 2 Table 29&30

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	110' Portable Tower	41.31	29.16	70.47
2.	Chainsaw 3 hours operating / day	0.41	3/8x1.09	0.82
3.				
4.				
5.				
6.				

Total Machine Rate..... $ 71.29

	B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1.	Hooktender	14.92	14.92
2.	Rigging Slinger	12.89	12.89
3.	2 Choker Setters	11.44	22.88

9353.3-PRODUCTION COSTS
SCHEDULE 4

4.	Chaser	12.32	12.32
5.	Yarding Engineer	13.29	13.29
6.			
7.			
8.			

Total Wage Rate.....$ 76.30

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 147.59 x 10%..... $ 14.759

D. Total Costs ..... $ 162.349

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 162.35

Per Hour $ 162.35

Per Minute $ 2.706

Remarks:

9353.3-PRODUCTION COSTS (C2611)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD LOGGING - LOADING

Reference for Cost Table Illustration 2 Table 24, 26, 29

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. MOBILE LOADER-BARKO 450 (TRACK) 1 hr. FIXED COST-OPERATE @ 75% of Cost	9.72	.75x 6.94	14.93
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 14.93

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Loading Engineer	14.00	14.00
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.00

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 28.93 x 10%..... $ 2.89

D. Total Costs ..... $ 31.82

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ 31.82

Per Minute $ .530

Remarks:

9353.3-PRODUCTION COSTS (C2b12)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD LOGGING - RIGGING COSTS

WASHINGTON 78A RIGGING FOR YARDING 1ST POLE 23

Reference for Cost Table Illustration 2 Table 25

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Washington 78A 6 hours fixed cost 2 hours operating cost 1/	6x22.57	2x14.37	164.16
2. Chainsaw 6 hours fixed cost	6x0.41	--	2.46
3. Mobile Yarder Barko 450 (track) 6 hours fixed, 2 hours operating cost	6x9.72	2x6.94	72.20
4. Tractor-Dozer D7G 6 hours fixed cost 4 hours operating cost 2/	6x13.30	4x15.57	142.08
5.			
6.			
Total Machine Rate.....			$ 380.90

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Yarding Engineer (6 hours)	6x13.29	79.74
2. Rigging Slinger (6 hours)	6x12.89	77.34
3. 2-Choker Setters	12x11.44	137.28

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Chaser (6 hours) 6 x 12.32 73.92
5. Hooktender (6 hours) 6 x 14.92 89.52
6. Loading Engineer (6 hours) 6 x 14.00 84.00
7. Chaser (6 hours) 2/ 6 x 12.32 73.92
8. Tractor Operator 2/ 6 x 14.73 88.38

Total Wage Rate.....$ 704.10

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 1085.00 x 10%..... $ 108.50

D. Total Costs ..... $ 1193.50

II Misc. Add'l Costs/Adjustments

1/ 3 hours to rig and 3 hours to take down for highway transportation.

2/ Landing construction

III Operating Cost

Total ..... $ 1193.50

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD LOGGING- RIGGING COSTS

WASHINGTON 78A YARDER ADDITIONAL POLES

Reference for Cost Table Illustration 2 Table 25

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Washington 78A yarder 2 hours fixed cost, 2 hours operating cost	2x22.57	2x14.37	73.88
2. Chainsaw 2 hours fixed costs	2x0.41		0.82
3. Mobile loader Barko 450 (track) 2 hours fixed cost, 1 hour operating cost.	2x 9.72	6.94	26.38
4. Tractor - Dozer D7G 4 hours fixed cost 4 hours operating cost 1/	4x13.30	4x15.57	115.48
5.			
6.			

Total Machine Rate..... $ 216.56

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Yarding Engineer (2 hours)	2x13.29	26.58
2. Rigging Slinger (2 hours)	2x12.89	25.78
3. 2-Choker Setters (2 hours)	4x11.44	45.76

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Chaser (2 hours) 2x12.32 24.64
5. Hooktender (2 hours) 2x14.92 29.84
6. Loading Engineer (2 hours) 2x14.00 28.00
7. Chaser (4 hours) 1/ 4x12.32 49.28
8. Tractor Operator-large (4 hours) 4x14.73 58.92

1/ Total Wage Rate.....$ 288.80

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 505.36 x 10%..... $ 50.536

D. Total Costs ..... $ 555.896

II Misc. Add'l Costs/Adjustments

1/ Landing construction

III Operating Cost

Total ..... $ 555.90

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2613)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD RIGGING COSTS - 90' TOWER 1ST POLE

Reference for Cost Table Illustration 2 Table 25

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 90' Tower w/ Berger yarder 6 hours fixed costs, 2 hours operating cost 1/	6x21.35	2x19.24	166.58
2. Chainsaw 6 hours fixed cost	6x0.41	---	2.46
3. Barko 450 track loader, 6 hours fixed costs 2 hours operating costs	6x9.72	2x6.94	72.20
4. Tractor-Dozer D7G 6 hours fixed costs 4 hours operating costs	6x13.30	4x15.57	142.08
5.			
6.			

Total Machine Rate..... $ 383.32

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Yarder Engineer (6 hours)	6x13.29	79.74
2. Rigging Slinger (6 hours)	6x12.89	77.34
3. 2-Choker Setters (6 hours)	12x11.44	137.28

9353.3-PRODUCTION COSTS
SCHEDULE 4

4.	Chaser (6 hours)	6 x 12.32	73.92
5.	Hooktender (6 hours)	6 x 14.92	89.52
6.	Loading Engineer (6 hours)	6 x 14.00	84.00
7.	Tractor Operator-Large (6 hrs)	6 x 14.73	88.38
8.			

Total Wage Rate..... $ 630.18

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 1013.50 x 10%..... $ 101.35

D. Total Costs ..... $ 1114.85

II Misc. Add'l Costs/Adjustments

1/ 3 hours to rig and 3 hours to take down for highway transportation.

III Operating Cost

Total ..... $ 1114.85

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b13)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD LOGGING - RIGGING 90' TOWER ADDITIONAL POLE

Reference for Cost Table Illustration 2 Table 25
I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 90' Tower w/ Berger Yarder, 2 hours fixed cost, 2 hours operating cost	2x21.35	2x19.24	81.18
2. Chainsaw 2 hours fixed cost	2x0.41	- -	0.82
3. Barko 450 Track Loader. 2 hours fixed costs 1 hour operating cost	2x9.72	6.94	26.38
4. Tractor-Dozer D7G 8 hours fixed cost 4 hours operating cost	8x13.30	4x15.57	168.68
5.			
6.			

Total Machine Rate..... $ 277.06

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Yarding Engineer (2 hours)	2x13.29	26.58
2. Rigging Slinger (2 hours)	2x12.89	25.78
3. 2 Choker Setters (2 hours)	4x11.44	45.76

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Chaser (2 hours) 2x12.32 24.64
5. Hooktender (2 hours) 2x14.92 29.84
6. Loading Engineer (2 hours) 2x1400 28.00
7. Tractor Operator (large-2 hours) 4x14.73 58.92
8. _____ _____ _____

Total Wage Rate.....$ 239.52

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 516.58 x 10%..... $ 51.658

D. Total Costs ..... $ 568.238

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 568.24

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2614)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGH LEAD LOGGING - RIGGING COST 110' TOWER 1ST POLE

Reference for Cost Table Illustration 2 Table 25

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	110' Tower w/BU 98 6 hours fixed cost 2 hours operating cost *	6x41.31	2x29.16	306.18
2.	Chain saw 6 hours fixed cost	6x0.41	- -	2.46
3.	Barko 450 Track Loader. 6 hours fixed cost. 2 hours operating cost.	6x9.72	2x6.94	72.20
4.	Tractor Dozer D7G 6 hours fixed cost 4 hours operating cost	6x13.30	4x15.57	142.08
5.				
6.				

Total Machine Rate..... $ 522.92

		Hour Rate	Total
B.	Wage Rates (Adjusted Hourly Rate) Crew Position/Time		
1.	Yarder Engineer (6 hours)	6x13.29	79.74
2.	Rigging Slinger (6 hours)	6x12.89	77.34
3.	2 Choker Setters (6 hours)	12x11.44	137.28

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Chaser (6 hours) 6 x 12.32 73.92
5. Hooktender (6 hours) 6 x 14.92 89.52
6. Loading Engineer (6 hours) 6 x 14.00 84.00
7. Tractor Operator-Large (6 hours) 6 x 14.73 88.38
8. ** _____ _____

Total Wage Rate.....$ 630.18

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 1153.10 x 10%..... $ 115.31

D. Total Costs ..... $ 1268.41

II Misc. Add'l Costs/Adjustments

* 3 hours to rig and 3 hours to take down for highway transportation.
** Landing construction.

III Operating Cost

Total ..... $ 1268.41

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2614)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD LOGGING -- RIGGING 110' TOWER ADDITIONAL POLE

Reference for Cost Table Illustration 2 Table 25

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 110' Tower w/Bu 98 Yarder. 2 hours fixed cost. 2 hours operating cost.	2x41.31	2x29.16	140.94
2. Chainsaw 2 hours fixed cost	2x0.41	--	0.82
3. Barko 450 track loader. 2 hours fixed cost. 1 hour operating cost	2x9.72	6.94	26.38
4. Tractor - Dozer D7G 4 hours fixed cost 4 hours operating cost	4x13.30	4x15.57	115.48
5.			
6.			
Total Machine Rate.....			$ 283.63

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Yarding Engineer (2 hours)	2x13.29	26.58
2. Rigging Slinger (2 hours)	2x12.89	25.78
3. 2 Choker Setters (2 hours)	4x11.44	45.76

9353.3-PRODUCTION COSTS
SCHEDULE 4

4.	Chaser (2 hours)	2 x 12.32	24.64
5.	Hooktender (2 hours)	2 x 14.92	29.24
6.	Loading Engineer (2 hours)	2 x 14.00	28.00
7.	Tractor Operator-Large (4 hours)	4 x 14.73	58.92
8.			

Total Wage Rate.....$ 238.92

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 522.55 x 10%..... $ 52.255

D. Total Costs ..... $ 574.805

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 574.81

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- SKYLINE LOGGING - YARDING 110' PORTABLE TOWER-YARDER

Reference for Cost Table Illustration 2, Table 31-34

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 110' Tower w/Skagit Yarder, Skycar and single drum.	77.96	54.70	132.66
2. Chainsaw Fixed cost 1 hour. Operating rate based on 3 hours/day	0.41	3/8 x 1.09	0.82
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 133.48

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Hooktender	14.92	14.92
2. Yarding Engineer	13.29	13.29
3. 3 Choker Setters	3 x 11.44	34.32

9353.3-PRODUCTION COSTS
SCHEDULE 4

4.	Chaser	12.32	12.32
5.	Head Rigger	13.10	13.10
6.			
7.			
8.			

Total Wage Rate.....$ 87.95

C. General and Administrative Costs
10% of Machine and Wage Rates

$221.43 x 10%..... $ 22.143

D. Total Costs ..... $ 243.573

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 243.57

Per Hour $ 243.57

Per Minute $ 4.060

Remarks:

9353.3-PRODUCTION COSTS (C2616)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- SKYLINE LOGGING - LOADING 110' TOWER W/ YARDER

Reference for Cost Table Illustration 2 Table 31,32

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Barko 450 track loader- Fixed cost per hour plus hourly operating rate at 75% 1/	9.72	.75x6.94	14.93
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 14.93

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Loading Engineer	14.00	14.00
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.00

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 28.93 x 10%..... $ 2.893

D. Total Costs ..... $ 31.818

II Misc. Add'l Costs/Adjustments

1/ Reduction of 25 % operating time reflects waiting time for yarder and machine down time.

III Operating Cost

Total ..... $ 31.82

Per Hour $ 31.82

Per Minute $ 0.530

Remarks:

9353.3-PRODUCTION COSTS (C2617)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- SKYLINE LOGGING - RIGGING COST 1ST POLE AND ADDITIONAL POLES

Reference for Cost Table Illustration Table 30
I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Tower/Yarder/Skycar/ 16x7.96 6x4.95 127.06 Drum. 16 hours fixed cost 6 hours operating cost 1/			
2. Chainsaw 16x0.41 -- 6.56 16 hours fixed cost			
3. Barko 450 Track loader 16x9.72 2x6.94 169.40 16 hours fixed cost 2 hours operating cost			
4. Tractor-Dozer D7G 11x13.30 10x15.57 302.00 11 hours fixed cost 10 hours operating cost 2/			
5.			
6.			

Total Machine Rate..... $ 1755.02

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time 3/	Hour Rate	Total
1. Hooktender (18 hours)	18 x 14.92	268.56
2. Yarding Engineer (18 hours)	18 x 13.29	239.22
3. 3 Choker Setters (18 hours)	54 x 11.44	617.76

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Chaser (18 hours) 18x12.32 221.76
5. Head Rigger (18 hours) 18x13.10 235.80
6. Loading Engineer (18 hours) 18x14.00 252.00
7. Tractor Operator (8 hours) 8x14.73 117.84
8. _____ _____ _____

Total Wage Rate.....$ 1952.94

C. General and Administrative Costs
10% of Machine and Wage Rates

$3707.96 x 10%..... $ 370.796

D. Total Costs ..... $ 4078.756

II Misc. Add'l Costs/Adjustments

1/ 12 hours to rig and 4 hours to tear down ready for transportation in lieu of operating cost- allowed for Yarder Skycar.

2/ 9 hours machine time for landing construction 7 hours fixed time -- 1 hour operating time to assist in rigging single drum.

3/ Rigging Tower/Yarder -- Crew time 16 hours drum rigging. 2 hours dozer operator for landing construction and drum rigging.

III Operating Cost

Total ..... $ 4078.76

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b17)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- SKYLINE LOGGING - RIGGING COST 1ST TAIL HOLD

Reference for Cost Table Illustration 2 Table 30

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Tower/Yarder/Skycar/6x77.96 Drum 6 hours fixed costs 6 hours operating costs 1/	6x4.95		497.46
2. Tractor-Dozer D7G 6 hours fixed cost 2 hours operating cost 2/	6x13.30	2x15.57	110.94
3. Chainsaw 1 hour machine cost 1 hour operating cost	0.41	1.09	1.50
4.			
5.			
6.			

Total Machine Rate..... $ 609.90

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Hooktender (6 hours)	6x14.92	89.52
2. Yarder Engineer (6 hours)	6x13.29	79.74
3. 3 Choker Setters (6 hours)	18x11.44	205.92

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Chaser (6 hours) 6x12.32 73.92
5. Head Rigger (16 hours) 16x13.10 209.60
6. Loading Engineer (6 hours) 6x14.00 84.00
7. Tractor Operator-Large 88.38
8. (6 hours)

Total Wage Rate.....$ 831.26

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 1441.16 x 10%..... $ 144.116

D. Total Costs ..... $ 1585.276

II Misc. Add'l Costs/Adjustments

1/ In lieu of operating cost allowance made for fuel of yarder skycar

2/ Aid in rigging tailholds, anchors, pulling lines, etc.

III Operating Cost

Total ..... $ 1585.28

Per Hour $

Per Minute $

Remarks:

9353.3-PRODUCTION COSTS (C2b17)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- SKYLINE LOGGING - RIGGING COSTS
ADDITIONAL TAIL HOLDS

Reference for Cost Table Illustration 2 Table 30
I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Tower/Yarder/Skycar/ 6x77.96 6x4.95 Drum 6 hours fixed cost 6 hours operating cost (Fuel) 1/			497.46
2. Chainsaw 1 hour machine cost	0.41	1.09	1.50
3. Tractor Dozer D7G 6 hours fixed cost 2 hours operating cost 2/	6x13.30	2x15.57	110.94
4.			
5.			
6.			
Total Machine Rate.....			$ 609.90

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Hook tender (6 hours)	6x14.92	89.52
2. Loading Engineer (6 hours)	6x13.29	79.74
3. 3 Choker Setters (6 hours)	18x11.44	205.92

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Chaser (6 hours) 6x12.32 73.92
5. Head Rigger (6 hours) 6x13.10 78.60
6. Tractor Operator-Large 6x14.73 88.38
7. (6 hours)
8.

Total Wage Rate.....$ 616.08

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 1225.98 x 10%..... $ 122.598

D. Total Costs ..... $ 1348.578

II Misc. Add'l Costs/Adjustments

1/ In lieu of operating cost allowance made for fuel of yarder skycar

2/ Aid in rigging tail hold anchors, pulling line, etc.

III Operating Cost

Total ..... $ 1348.58

Per Hour $

Per Minute $

Remarks:

FORM 5-PRODUCTION COSTS (C2b18)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGH LEAD SWINGING - HOT AND COLD DECK SWINGING

Reference for Cost Table Illustration 2 Table 36 & 37

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 90' Tower Machine rate / hour	21.35	19.24	40.59
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 40.59

B. Wage Rates (adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Chaser	12.32	12.32
2. Yarding Engineer	13.29	13.29
3.		

FESS.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 25.61

I. General and Administrative Costs
10% of Machine and Wage Rates

$ 66.20 x 10%..... $ 6.62

II. Total Costs ..... $ 72.82

III. Other Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 72.82

Per Hour $ 72.82

Per Minute $ 1.214

Remarks:

9353.3-PRODUCTION COSTS (C2619)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- HIGHLEAD SWINGING - RIGGING COST - SWING POLE

Reference for Cost Table Illustration 2 Table 35

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	90' Tower 20 hours fixed cost 4 hours operating cost		20x21.354x19.24	503.96
2.	Tractor Dozer Cat D7G 4 hours machine cost		4x13.30 4x15.57	115.48
3.				
4.				
5.				
6.				
	Total Machine Rate.....			$ 619.44

	B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1.	Yarding Engineer (20 hours)	20 x 13.29	265.80
2.	Chaser (20 hours)	20 x 12.32	246.40
3.	Tractor Operator-Large (4 hours)	4 x 14.73	58.92

9355.3-PRODUCTION COSTS
SCHEDULE

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 571.12

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 1190.56 × 10%..... $ 119.056

D. Total Costs ..... $ 1309.616

II Misc. Add'l Costs: [illegible]

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 1309.62

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COLD DECK LOADING - BARKO 450 TRACKED

Reference for Cost Table 9353.33H1

I Determining Hourly Cost

		Fixed	Operating	Total
A. Machine Rates Machine/Time				
1.	*Mobile Loader Barko 450 Track Loader 8 hr. Machine Cost	8x9.72	8x6.94	133.28
2.				
3.				
4.				
5.				
6.				
	Total Machine Rate.....			$ 133.28

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time		Hour Rate	Total
1.	Loading Engineer 8 hrs.	8X14.00	112.00
2.			
3.			

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 112.00

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 245.28 x 10%..... $ 24.53

D. Total Costs ..... $ 269.81

II Misc. Add'l Costs/Adjustments

* Cost per thousand based on total production of 125 MBF net loaded per day.

$269.81 ÷ 125 = $2.16/MBF

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d21)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COLD DECK LOADING - BARKO 450 RUBBER TIRED

Reference for Cost Table

I Determining Hourly Cost

		Fixed	Operating	Total
A. Machine Rates Machine/Time				
1.*	Mobile Loader Barko 450 Rubber Tired 8 hrs Machine Cost	8x10.38	8x7.48	142.88
2.				
3.				
4.				
5.				
6.				
	Total Machine Rate.....			$ 142.88

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time		Hour Rate	Total
1.	Loading Engineer 8 hours	8x14.00	112.00
2.			
3.			

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 112.00

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 254.88 x 10%..... $ 25.49

D. Total Costs ..... $ 280.37

II Misc. Add'l Costs/Adjustments

*Total estimated production per 8 hour day = 165 MBF

$280.37 ÷ 165 MBF = $1.70/MBF

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d22)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- MISC. SMALL SALE OPERATIONS - LIGHT MOBILE LOADER BARKO 160 (COLD DECK) LOADING

Reference for Cost Table Illustration 2 Table 39

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1.* Mobile Log Loader Barko 160 Machine Rate 8 hours	8x4.62	8x4.58	73.60
2.			
3.			
5.			
6.			
Total Machine Rate.....			$ 73.60

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Loading Engineer	8x14.00	112.00
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 112.00

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 185.60 x 10%..... $ 18.56

D. Total Costs ..... $ 204.16

II Misc. Add'l Costs/Adjustments

* Total estimated production per 8 hour day = 125 MBF

$204.16 ÷ 125 MBF = $1.63/MBF

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2623)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- MISC. SMALL SALE OPERATIONS

RIGGING COST 1ST LANDING

Reference for Cost Table Illustration 2 Table 37

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Barko 160 Mobile Loader 1 hr. Fixed Cost	4.62		4.62
2. Logging Truck/ Tractor (Carrier for Loader) 1 hr. operating cost		10.83	10.83
3. Tractor D7G (Assist in Set Up 1 hr. Machine Cost	13.30	15.57	28.87
4. Chainsaw 1 hr. Fixed Cost	.41		.41
5.			
6.			
Total Machine Rate.....			$ 44.73

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1.* Loading Engineer (1 hr.)	14.00	14.00
2. Choker Setter (1 hr.)	11.44	11.44
3. Tractor Operator (1 hr.)	14.73	14.73

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 40.17

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 84.90 x 10%..... $ 8.49

D. Total Costs ..... $ 93.39

II Misc. Add'l Costs/Adjustments

* Loading engineer drives logging truck carrier for loader

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b23)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- MISC. SMALL SALE OPERATIONS

RIGGING COST ADD'L LANDINGS

Reference for Cost Table ILLUSTRATION 2 TABLE 37

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Barko 160 Mobile Log Loader ½ hr. Fixed Cost	.5x4/62		2.31
2. Logging Truck/Tractor (Corrige for Loader) ½ hr Operating Cost		.5x 10.83	5.42
3. Tractor Cat. D7G Assist in Set Up ½ hr. Machine Rate	.5x13.30	.5x15.57	14.44
4. Chainsaw ½ hr. Fixed cost	.5x.41		.21
5.			
6.			
Total Machine Rate.....			$ 22.38

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Loading Engineer (½ hr.)	14.00	7.00
2. Choker Setter (½ hr.)	11.44	5.72
3. Tractor Operator (½ hr.)	14.73	7.37

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 20.09

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 42.47 x 10%..... $ 4.25

D. Total Costs ..... $ 46.72

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b24)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- MISC. SMALL SALE OPERATION - YARDING BY YARDER/LOADER

Reference for Cost Table Illustration 2 Table 40

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. SJ-5R Yarder/ Loader (Used) machine rate	12.83	11.75	24.58
2. Chainsaw Fixed cost÷3 hours/day operating cost	0.41	3/8x1.09	0.82
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 25.40

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Loading Engineer	14.00	14.00
2. Choker Setter	11.44	11.44
3. Chaser	12.32	12.32

9353.3-PRODUCTION COSTS
SCHEDULE 4

6. _____

5. _____

4. _____

3. _____

2. _____

Total Wage Rate.....$ 37.76

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 63.16 x 10%..... $ 6.316

D. Total Costs ..... $ 69.476

E. Other Additions/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 69.48

Per Hour $ 69.48

Per Minute $ 1.158

Remarks:

9353.3-PRODUCTION COSTS (C2625)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- MISC. SMALL SALE OPERATIONS - RIGGING COST FOR YARDER/LOADER

Reference for Cost Table Illustration 2 Table 40

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. SJ-5R Yarder/Loader (used) 1 hour machine cost	12.83	11.75	24.58
2. Chainsaw 1 hour Fixed cost	0.41	--	0.41
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 24.99

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Loader Operator	14.73	14.73
2. Choker Setter	11.44	11.44
3. Chaser	12.32	12.32

9239.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 38.49

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 63.48 x 10%..... $ 6.348

D. Total Costs ..... $ 69.828

II Other Appl. Costs / Assessments

_____ _____ _____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 69.83

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b 26)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- MISC. SMALL SALE OPERATIONS
LOADING BY YARDER/LOADER

Reference for Cost Table Illustration 2 Table 39

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. SJ-5R (USED EQUIPMENT YARDER-LOADER 8 hr. Production Day	8x12.83	8x11.75	196.64
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 196.64

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time		Hour Rate	Total
1. Loading Engineer	(8 hours)	8x14.00	112.00
2. Choker Setter	(8 hours)	8x11.44	91.52
3. Chaser	(8 hours)	8x11.44	91.52

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 295.04

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 491.68 x 10%..... $ 49.17

D. Total Costs ..... $ 540.85

II Misc. Add'l Costs/Adjustments

Total production per day 125 MBF

#540.85 ÷ 125 = #4.33/MBF

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d27)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COMMERCIAL THINNING - YARDING W/ LIGHT CRAWLER TRACTOR

Reference for Cost Table Illustration 2 Table 43

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Light yarding tractor D4D Machine rate 1 hour	5.19	4.73	9.92
2. Chainsaw Fixed cost plus 2 hours operating cost/day	0.41	2/8x1.09	0.68
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 10.60

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator-small 1/	14.17	14.17
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.17

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 24.77 x 10%..... $ 2477

D. Total Costs ..... $ 27.25

II Misc. Add'l Costs/Adjustments

1/ Tractor Operator - Setting and releasing chokers. Adjustment factor - Delay factor for complete skidding cycle from PNW-41 = 38.5%.

Total costs (27.25) x 1.385 = 37.74

III Operating Cost

Total ..... $ 37.74

Per Hour $ 37.74

Per Minute $ 0.629

Remarks:

9353.3-PRODUCTION COSTS (C2628)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COMMERCIAL THINNING - YARDING W/4 WHEEL SKIDDER

Reference for Cost Table Illustration 2 Table 44

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 4 wheel skidder John Deere 440B Machine rate 1 hour	4.57	6.02	10.59
2. Chainsaw Fixed cost plus 2 hours operating rate/day	0.41	2/8x1.09	0.68
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 11.25

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator-small 1/	14.17	14.17
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 14.17

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 25.44 x 10%..... $ 2.544

D. Total Costs ..... $ 27.984

II Misc. Add'l Costs/Adjustments

1/ Skidder Operator -- Setting and releasing chokers Adjustment factor -- Delay factor for complete skidding cycle From PNW-41 = 38.5 %

TOTAL COST (27.984) x 1.385 = 38.7578

III Operating Cost

Total ..... $ 38.76

Per Hour $ 38.76

Per Minute $ 0.646

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COMMERCIAL THINNING - LOADING

Reference for Cost Table Illustration 2 Page 47

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Light Mobile Loader Barko 160 Machine Rate 1 hour	4.62	4.58	9.20
2. Chain Saw Fixed Cost plus operating cost for 3 hrs./day	.41	1.09	1.50
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 10.70

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Loading Engineer	14.00	14.00
2. Chaser	11.44	11.44
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 25.44

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 36.14 x 10%..... $ 3.61

D. Total Costs ..... $ 39.75

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ 39.75

Per Minute $ .663

Remarks:

9353.3-PRODUCTION COSTS (C2b30)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COMMERCIAL THINNING - RIGGING COST

CRAWLER TRACTOR 1st Landing

Reference for Cost Table Illustration 2 Table 42

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 2 Light tractors D4D 8x5.19 4 hours fixed cost			41.52
2. Chainsaw 5 hours fixed cost		5x.041	2.05
3. Light mobile loader Barko 160 2 hours machine cost	2x4.62	2x4.58	18.40
4. Light tractor Cat D4D (landing construction) 2 hours machine rate	2x5.19	2x4.73	19.84
5.			
6.			

Total Machine Rate..... $ 81.81

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. 2 Tractor Operators-sm. (5hrs.)	10 x 14.17	141.70
2. Loading Engineer (2 hours)	2 x 14.00	28.00
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 169.70

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 251.51 x 10%..... $ 2.515

D. Total Costs ..... $ 276.66

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

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_____

_____

III Operating Cost

Total ..... $ 276.66

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COMMERCIAL THINNING - RIGGING COST

CRAWLER TRACTOR - ADDITIONAL LANDING

Reference for Cost Table Illustration 2 Table 42

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 2 Light tractors Cat D4D 1 hour machine cost	2x5.19	2x4.73	19.84
2. Chainsaw 1/2 hour machine cost	1/2x0.41		0.21
3. Light mobile loader Barko 160 1 hour machine rate	4.62	4.58	9.20
4. Light tractor Cat D4D (landing construction) 2 hour machine cost	2x5.19	2x4.73	19.84
5.			
6.			
Total Machine Rate.....			$ 49.09

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. 2 Tractor Operators (sm.) (2hrs.)	4x14.17	56.68
2. Loading Engineer (1 hour)	14.00	14.00
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 80.68

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 129.77 x 10%..... $ 12.977

D. Total Costs ..... $ 142.75

II Misc. Add'l Costs/Adjustments

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III Operating Cost

Total ..... $ 142.75

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b30)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COMMERCIAL THINNING RIGGING

COST WHEEL SKIDDER 1ST LANDING

Reference for Cost Table Illustration 2 Table 42

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 2 Rubber Tired 4 Wheel Skidder John Deere 440B 4 hrs. Fixed Cost	8x4.57		36.56
2. Chainsaw 5 hrs. Fixed Cost	5x.41		2.05
3. Light Mobile Loader Barko Model 160 2 hrs. Machine Cost	2x4.62	2x4.58	18.40
4. Wheel Skidder w/Blade JD440B landing const. 3 hrs. Machine Rate	3x4.57	3x6.02	31.77
5.			
6.			
Total Machine Rate.....			$ 88.78

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. 2 Tractor operators (5m.) (6hrs.)	12x 14.17	170.04
2. Loading Engineer (2hrs)	2x 14.00	28.00
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 198.04

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 286.82 x 10%..... $ 28.68

D. Total Costs ..... $ 315.50

II Misc. Add'l Costs/Adjustments

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_____

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III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b30)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COMMERCIAL THINNING RIGGING

COST WHEEL SKIDDER Add'l Landings

Reference for Cost Table Illustration 2 Table 42

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 2 Rubber Tired 4/wheel Skidders John Deere 440B 1 Hour Machine Rate	2x4.57	2x6.02	21.18
2. Chain Saw ½ hour Fixed Cost	½x.41		.21
3. Light Mobile Loader Barko Model 160 1 hour Machine Rate	4.62	4.58	9.20
4. Wheel Skidder w/Blade J.D. 440B Landing Const. 3 hours Machine Rate	3x4.57	3x6.02	31.77
5.			
6.			
Total Machine Rate.....			$ 62.36

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. 2 Tractor Operators (Sm) (2hrs)	4x14.17	56.68
2. Loading Engineer (1hr)	14.00	14.00
3.		

9353.3--PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 70.68

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 133.04 x 10%..... $ 13.30

D. Total Costs ..... $ 146.34

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

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_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2b31)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- COMMERCIAL THINNING LOADING BY FRONT END LOADER

Reference for Cost Table Illustration 2 Table 4b

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Front End Log Loader Cat. 966C 6hr. Production Day	6.14	.75x8.74	12.70
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 12.70

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Front End Loader Operator	14.73	14.73
2. (Tractor Operator-Large)		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 14.73

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 27.43 x 10%..... $ 2.743

D. Total Costs ..... $ 30.173

II Misc. Add'l Costs/Adjustments

√ Reduction (operating time) of 25% reflects waiting time for trucks and downtime for machine.

III Operating Cost

Total ..... $ 30.17

Per Hour $ 30.17

Per Minute $ 0.503

Remarks:

9353.3-PRODUCTION COSTS (C2b32)
SCHEDULE 4
Operating Cost Computations

Activity- RIGGING, YARDING AND LOADING

Operations- MISC. SMALL SALE OPERATIONS - LOADING BY YARDER/LOADER

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. SJ-5R (used) Yarder/Loader Machine cost/hour	12.83	11.75	24.58
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 24.58

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Loading Engineer	14.00	14.00
2. Choker Setter	11.44	11.44
3. Chaser	12.32	12.32

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 37.76

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 62.34 x 10%..... $ 6.23

D. Total Costs ..... $ 68.57

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 68.57

Per Hour $ 68.57

Per Minute $ 1.142

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- TRANSPORTATION

Operations- TRUCK HAULING - OPERATING COST

Reference for Cost Table Illustration 3 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Truck - White Model 4964 w/Peerless Trailer - Machine Rate	6.25	10.83	17.08
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 17.08

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Truck Driver	11.02	11.02
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate..... $ 11.02

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 28.10 x 10%..... $ 2.81

D. Total Costs ..... $ 30.91

II Misc. Add'l Costs/Adjustments

Adjustment - Truck Drivers Overtime Wage Rate
Overtime Rate = Machine rate + Truck Driver
overtime rate / hour = $17.08 + $13.90 = $30.98
+ 10% General and Administrative Costs =
$ 34.08 / hour overtime
$ 0.568 / minute overtime

III Operating Cost (regular time)

Total ..... $ _____

Per Hour $ 30.91

Per Minute $ 0.515

Remarks:

9353.3-PRODUCTION COSTS (C2c2)
SCHEDULE 4
Operating Cost Computations

Activity- TRANSPORTATION

Operations- TRUCK HAULING - DELAY COST

Reference for Cost Table Illustration 3 Table 1

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Truck - White Model 4964 w/ Peerless Trailer - Fixed Cost - 1 hour	6.25		6.25
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 6.25

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Truck Driver	11.02	11.02
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 11.02

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 17.27 x 10%..... $ 1.727

D. Total Costs ..... $ 18.997

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ 19.00

Per Minute $ 0.317

Remarks:

9353.3-PRODUCTION COSTS (C2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN BASIC CONSTRUCTION UNIT

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	Tractor mounted dozer Cat D8K-79,000 lbs. complete wt. 200 lbs w/o blade. 8 hours fixed cost	8x19.09	—	152.72
2.	Low bed for hauling tractor w/o blade rented 4 hours	4x33.82	4x6.75	162.28
3.	Low bed for hauling tractor blade, compressor, & track drill-rental 4 hours 1/	4x33.82	4x6.75	162.28
4.	Flag cars-Use 2 crew trucks. 4 hours fixed rate each. 2 hours operating rate each. 2/	4x0.97	4x3.32	17.16
5.	Motor Grader-Cat 12F 3 hours machine rate	3x4.91	3x5.54	31.35
6.				
	Total Machine Rate.....			$ 529.67

B.	Wage Rates (adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1.	Tractor Operator-Large (8 hrs)	8x 14.72	117.76
2.	Chaser (8 hours)	8 x 12.32	98.52
3.	Drill Operator (2 hours)	2 x 13.13	26.26

9353.3-PRODUCTION COSTS
SCHEDULE 4

4.	Laborer (2 hours)	2 x 12.32	24.64
5.	Motor Grader Operator (3 hours)	3 x 13.45	40.35
6.	Lowbed Driver (2) (4 hours ea.)	8 x 11.35	90.80
7.			
8.			

Total Wage Rate..... $ 398.33

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 928.00 x 10%..... $ 92.80

D. Total Costs ..... $ 1020.80

II Misc. Add'l Costs/Adjustments

1/ Machine rate and delay costs not allowed for compressor or drill (track) as rental rate applies to operation time only

2/ Driven by laborer and chaser

III Operating Cost

Total ..... $ 1020.80

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN TRACTOR DOZER

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	Tractor Mounted Dozer D8K 78,000 lbs complete 8 hrs. fixed cost	8x19.09		152.72
2.	Lowbed for Hauling Tractor 8 hour round trip Rental	8x33.82	8x6.75	324.56
3.	Flag Cars - Use Crew Car Rate	16x.97	16x3.32	68.64
4.				
5.				
6.				
	Total Machine Rate.....			$ 545.92

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Tractor Dozer Operator (8hrs)	8 x 14.73	117.84
2. Chaser (8 hrs)	8x 12.32	98.56
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate..... $ 216.40

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 762.32 x 10%..... $ 76.23

D. Total Costs ..... $ 838.55

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (c2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN AIR COMPRESSOR & TRACK DRILL

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Air Compressor And Track Drill RENTAL 600 CFM COMPRESSOR & 3½" Track Drill	No Fixed Cost On Rental Equipment in Transit		
2. Lowbed For Hauling Tractor 4 hour round trip - Rental		4x33.82 4x6.75	162.28
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 162.28

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time		Hour Rate	Total
1. Drill Operator	(2 hours)	11.44	22.88
2. Chaser	(2 hours)	12.32	24.64
3.			

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 47.52

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 209.80 x 10%..... $ 20.98

D. Total Costs ..... $ 230.78

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

(C2d1)

7353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- MOTOR GRADER MOVE-IN

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

		Fixed	Operating	Total
A. Machine Rates (Rental/Time)				
1.	Motor Grader 3hr. Machine Rate	3x4.91	3x5.54	31.35
2.				
3.				
4.				
5.				
6.				
	Total Machine Rate.....			$ 31.35

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Grader Operator (3hours)	3x 13.45	40.35
2.		
3.		

4353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 40.35

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 71.70 x 10%..... $ 7.17

D. Total Costs ..... $ 78.87

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN 3/4 CUBIC YARD SHOVEL

Reference for Cost Table Illustration 4/Table 2

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	Shovel - 3/4 C.Y. capacity - Rental 47,000 lbs.	No fixed costs on rental in transit		
2.	Lowbed for hauling shovel - 4 hour round trip - Rental rate	4x33.82	4x6.75	162.28
3.	Flag car - use crew car as flag car	2x0.97	2x3.32	8.58
4.				
5.				
6.				

Total Machine Rate..... $ 170.86

	B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1.	Shovel Operator (2 hours)	2x14.12	28.24
2.	Lowbed Driver (4 hours) use	4x11.35	45.40
3.	Log Truck Driver rate		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 73.64

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 244.50 x 10%..... $ 24.45

D. Total Costs ..... $ 268.95

II Misc. Add'l Costs/Adjustments

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_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 268.95

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN GRID ROLLER

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

		Fixed	Operating	Total
A.	Machine Rates Machine/Time			
1.	Grid Roller 16 tons Rental rate	No fixed cost on rental equipment in transit		
2.	Lowbed For hauling roller 4 hours round trip - rental	4x33.82	4x6.75	162.28
3.				
4.				
5.				
6.				

Total Machine Rate..... $ 162.28

	B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1.	Laborer (3 hours) use Chaser	3x12.32	36.96
2.	rate		
3.	Lowbed Driver (4 hours) Use	11.35x4	45.40

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. Log Truck Driver rate _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 82.36

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 24.64 x 10%..... $ 24.46

D. Total Costs ..... $ 269.10

II Misc. Add'l Costs/Adjustments

_____

_____

_____

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_____

_____

_____

_____

III Operating Cost

Total ..... $ 269.10

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN - VIBRATORY ROLLER

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Vibratory Roller 27 to 36 HP - Rental rate 1000 lbs.	No fixed cost on rental equipment in transit		
2. Lowbed for hauling roller - Rental 2 hour round trip	2x33.92	2x6.75	81.14
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 81.14

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Laborer (3hours @ Chaser	3x12.32	36.96
2. rate)		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____

5. _____

6. _____

7. _____

8. _____

Total Wage Rate.....$ 36.96

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 118.10 x 10%..... $ 11.81

D. Total Costs ..... $ 129.91

II Misc. Add'l Costs/Adjustments

Roller to be pulled by tractor or other equipment already on the job. If such equipment is not available allow the appropriate move-in cost.

III Operating Cost

Total ..... $ 129.91

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.2-PRODUCTION COSTS (c2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN DUMP TRUCK

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Dump Truck - Normal duty 8-12 C.Y. capacity Cost based on rental rate 2 hours	2x24.04	2x13.45	74.98
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 74.98

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Dump Truck Oper. (2 hours)	2x12.42	24.84
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 24.84

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 99.82 x 10%..... $ 9.982

D. Total Costs ..... $ 109.80

II Misc. Add'l Costs/Adjustments

Move-in based on operator driving truck to the job site. Rental rates include all costs such as license fee, etc.

III Operating Cost

Total ..... $ 109.80

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN FRONT END (BUCKET) LOADER

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Front End Loader Cat 950 2-2½ C.Y. capacity 3 hours machine rate based on rental	3x37.60	3x7.95	136.65
2. On highway trip permit - DMV			3.00
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 139.65

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator-Large	14.73	44.19
2. (3 hours)		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 44.19

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 183.84 x 10%..... $ 18.384

D. Total Costs ..... $ 202.22

II Misc. Add'l Costs/Adjustments

_____

_____

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_____

III Operating Cost

Total ..... $ 202.22

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d1)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EQUIPMENT MOVE-IN
LIGHT MISCELLANEOUS TRACTOR

Reference for Cost Table Illustration 4 Table 2

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Light (Misc) Use Crawler Tractor D6C 2hr. Delay 30,000 lbs	2x9.96		19.92
2. Lowbed for Hauling Tractor 6 hour round trip - Rental	6x33.82	6x6.75	243.42
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 263.34

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator (SM.) 2 hrs.	2 x 14.17	28.34
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 29.34

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 291.68 x 10%..... $ 29.17

D. Total Costs ..... $ 320.85

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d2)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- CLEARING - PER ACRE

Reference for Cost Table Illustration 4 Table 3

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. YARDING TRACTOR D7G Machine Rate 10.45 hrs Fixed Costs (delay) 2.5 hrs	12.85×13.30	10.45×16.57	334.94
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 334.94

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Tractor (Lge) (10.45 hrs)	14.73	153.93
2. Tractor (Lge) (1.98 hrs)	14.73	29.17
3. Chaser (10.58 hrs)	12.32	130.35

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 313.44

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 64838 x 10%..... $ 64.84

D. Total Costs ..... $ 713.06

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (c2d3)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EXCAVATION AND END HAUL WITH WHEEL SCRAPER

Reference for Cost Table Illustration 4 Table 10
I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Motor Scraper-Cat w/power shift-14-20 cubic yards-Rental 1/	62.40	13.00	75.40
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 75.40

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Scraper Operator	14.73	14.73
2. (Tractor Operator-Large)		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.73

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 90.13 x 10%..... $ 9.013

D. Total Costs ..... $ 99.04

II Misc. Add'l Costs/Adjustments

1/ Rates must be re-calculated in arriving at end hauling costs. Operating efficiency is only 35% of the total available working time.

III Operating Cost

Total ..... $ _____

Per Hour $ 99.04

Per Minute $ 1.65

Remarks:

9353.3-PRODUCTION COSTS (C24)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- EXCAVATION WITH 3/4 CUBIC YARD SHOVEL

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 3/4 cubic yard shovel rental 53% efficiency applied to operating cost	27.52	.53 x 7.90	31.71
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 31.71

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1. Shovel Operator	14.12	14.12
2. Laborer (use Chaser	12.32	12.32
3. rate)		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 26.44

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 58.15 x 10%..... $ 5.815

D. Total Costs ..... $ 63.96

II Misc. Add'l Costs/Adjustments

_____

_____

_____

_____

_____

_____

_____

_____

III Operating Cost

Total ..... $ 63.96

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2d5)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- SHOVEL LOADING - BANK TO TRUCK

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. 3/4 C.Y. Shovel 53% efficiency Rental rate	27.52	.53x7.90	31.71
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 31.71

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Shovel Operator	14.41	14.41
2. Laborer (Use Chaser	12.32	12.32
3. rate)		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 26.44

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 58.15 x 10%..... $ 5.815

D. Total Costs ..... $ 63.96

II Misc. Add'l Costs/Adjustments

Operating rate adjusted for 53% operating efficiency. Adjusted from swell from bank cubic yards (in place) to loose cubic yards loaded in the truck.

Bank CY/HR ÷ load factor or 50 CY/HR ÷ 60 = 83 CY/HR

Cost Calculation: $\frac{63.96}{83}$ = $0.77/C.Y. at 83 C.Y./HR.

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks: $0.77 / CU. YD.

9353.3-PRODUCTION COSTS (c2d6)
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- GRADING PER STATION

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Motor Grader Cat No 120.4 Operating and delay time - 20.4 min. Operating time 11.8 min.	2.08	11.8 x .092	2.76
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 2.76

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Grader Operator (20.4 min = 0.34 hour)	.34 x 13.45	4.57
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 4.57

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 7.33 x 10%..... $ 0.733

D. Total Costs ..... $ 8.063

II Misc. Add'l Costs/Adjustments

Time Study grading/station - Based on six(6) BLM time studies. Operating - 1559 min./131.86 STA. = 11.8 min./sta.
Delay - 1129 min/131.86 STA. = 8.6 min./sta.

III Operating Cost

Total ..... $ 8.06/STA.

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- SURFACING - LOADING (FROM STOCKPILE)

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Front end (bucket) loader Cat 950 2-2½ C.Y. capacity - Rental	37.60	7.95	45.55
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 45.55

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Loader Operator (Tractor	14.73	14.73
2. Operator - Large rate)		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.73

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 60.28 x 10%..... $ 6.028

D. Total Costs ..... $ 66.308

II Misc. Add'l Costs/Adjustments

Adjusted to cost per cubic yard
Estimated hourly production - 100 cubic yards
Calculation: 66.308 ÷ 100 cubic yards = $0.66/CY

III Operating Cost

Total ..... $ 0.66/CY

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- SPREADING - COST PER STATION

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Motor Grader Cat 12G 4.24 x .082 3.18 x .092 Operating and delay - 4.24 min. Operating - 3.18 min.			0.64
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 0.64

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Grader Operator (4.24 min. = .071 hr) .07 1 x 13.45		0.95
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 0.95

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 1.59 x 10%..... $ 0.159

D. Total Costs ..... $ 1.75

II Misc. Add'l Costs/Adjustments

Time study/station(in minutes)
Motor grader estimated 7 passes at 2.5 miles per hour for each 100' lift of aggregate, or 700 linear feet of grade spreading for each 100 foot station. Total time - Operating was estimated at 75 % of total spreading time. 2.5 MPH = 200'/MIN. 700'/200' = 3.18 Minutes/station. 3.18÷.75= 4.24 min total time/station

III Operating Cost

Total ..... $ 1.75 /100' station

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- ROLLING ROCK - VIBRATORY ROLLER PULLED BY CAT D6C

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Vibrator roller 27 to 36 HP - Rental	22.53	2.15	24.68
2. Towing tractor Cat D6C	8.69	8.57	17.26
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 41.94

	Hour Rate	Total
B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time		
1. Tractor Operator - Small	14.17	14.17
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.17

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 56.11 x 10%..... $ 5.61

D. Total Costs ..... $ 61.72

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 61.72

Per Hour $ 61.72

Per Minute $ 1.03

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- ROLLING - VIBRATOR ROLLER PULLED WITH RUBBER TIRED LOADER

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Vibrator roller 27 to 36 H.P. Rental rate	22.53	2.15	24.68
2. Towing tractor - Rubber tired loader Cat 950	37.60	7.95	45.55
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 70.23

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator-small	14.17	14.17
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.17

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 84.40 x 10%..... $ 8.44

D. Total Costs ..... $ 92.84

II Misc. Add'l Costs/Adjustments

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_____

III Operating Cost

Total ..... $ 92.84

Per Hour $ 92.84

Per Minute $ 1.55

Remarks:

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- ROAD CONSTRUCTION AND MAINTENANCE

Operations- ROLLING ROCK - GRID ROLLER WITH TRACTOR - CAT D6C

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Grid roller - 16 tons Rental	12.46	1.20	13.66
2. Towing tractor Cat D6C Machine rate	8.69	8.57	17.26
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 30.92

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator - Small	14.17	14.17
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.17

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 45.09 x 10%..... $ 4.509

D. Total Costs ..... $ 49.599

II Misc. Add'l Costs/Adjustments

III Operating Cost

Total ..... $ 49.60

Per Hour $ 49.60

Per Minute $ 0.827

Remarks:

9353.3-PRODUCTION COSTS (C2e1)
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION AND HAZARD REDUCTION

Operations- FIRE PROTECTION - PORTABLE PUMP

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Portable pump w/motor Edwards Mfg. Co. Model TSD-25			924.32
2. 500' of 1" hose @ $0.79 per foot (+ 6% sales tax)			418.70
3. Fog nozzle - Edwards Stop-O-Matic - Shut off control (15-45 lbs. range)			42.67
4. 1½"x 10' suction hose and strainer			66.99
5.			
6.			
Total Machine Rate.....			$ 1452.68

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1.		
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$_____

C. General and Administrative Costs
10% of Machine and Wage Rates

$ _____ x 10%..... $ _____

D. Total Costs ..... $ _____

II Misc. Add'l Costs/Adjustments

Adjustment

Equipment used 5 months @ 30 days/month = 150 days. Depreciation period - 5 years.

$ 1452.68 ÷ 5 = $ 290.54 per year

Calculation:

Cost per day = $290.54 ÷ 150 days = $1.936 per day

III Operating Cost

Total ..... $ 1.94/day

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2e1)
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION AND HAZARD REDUCTION

Operations- FIRE PROTECTION - TRAILER MOUNTED PUMP

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Trailer unit			956.12
2. Pump - Edwards Mfg. Co. Model St. 500 - 500 gal tank w/relief valve, suction hose, strainer			4463.66
3. hose reel, fog nozzle w/auto shut off valve, 250' of 1" hose, pump and reel covers.			
4. Additional 250' of 1" hose @ $0.79 per foot (plus 6% sales tax)			190.27
5.			
6.			
Total Machine Rate.....			$ 5610.05

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1.		
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$_____

C. General and Administrative Costs
10% of Machine and Wage Rates

$ _____ x 10%..... $ _____

D. Total Costs ..... $ _____

II Misc. Add'l Costs/Adjustments

Adjustment:

Equipment used 5 months @ 30 days per month or 150 days.

Depreciation period = 5 years, depreciation = $5610.05 ÷ 5 = $1122.01 per year.

Calculation: Cost per day = $1122.01 ÷ 150 days = $7.48 per day

III Operating Cost

Total ..... $ 7.48 per day

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2e1)
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION AND HAZARD REDUCTION

Operations- FIRE PROTECTION - TRUCK MOUNTED PUMP

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Used 1½ ton truck			3710.00
2. Slip on unit-Edwards Mfg. Co. Model ST 500 500 gallon tank w/ relief valve, suction hose,			4463.66
3. strainer, hose reel fog nozzle w/ automatic shut off valve, 250' of 1" hose, pump and reel covers			
4. Additional 250' of 1" hose @ $0.79 per foot (plus 6% sales tax)			209.35
5.			
6.			
Total Machine Rate.....			$ 8383.01

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1.		
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$_____

C. General and Administrative Costs
10% of Machine and Wage Rates

$ _____ x 10%..... $ _____

D. Total Costs ..... $ _____

II Misc. Add'l Costs/Adjustments

Adjustment:
Equipment used 5 months per year @ 30 days per month = 150 days per year. Depreciation period 5 years. Depreciation = $8383.01 ÷ 5 yrs. = $1676.60 per year
Calculation: $1676.60 ÷ 150 = $11.177 per day

III Operating Cost

Total ..... $ 11.18

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2e1)
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION AND HAZARD REDUCTION

Operations- FIRE PROTECTION - ASSOCIATED FIRE EQUIPMENT

Reference for Cost Table

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Psychrometer			17.44
2. 4-Hazel hoes @$16.97ea 3-Fire axes @$13.41ea. 3-Shovels @ 11.05ea 6% sales tax			149.31
3. 4 Back pumps @ $61.00 ea. + 6% sales tax			258.64
4. 10 head lights for men @ $8.96 ea. + 6% sales tax			94.98
5. 2 sets tractor head lights @ $325.00 per set + 6% sales tax			689.00
6. Metal fire box 12" x 12" x 5' w/ lock			153.70
Total Machine Rate.....			$ 1363.07

B. Wage Rates (Adjusted Hourly Rate)

Crew Position/Time	Hour Rate	Total
1.		
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$_____

C. General and Administrative Costs
10% of Machine and Wage Rates

$ _____ x 10%..... $ _____

D. Total Costs ..... $ _____

II Misc. Add'l Costs/Adjustments

Equipment used 5 months @ 30 days per month = 150 days per year. Depreciation period 5 years. Depreciation = $1363.07 ÷ 5 yrs = $ 272.61 Calculation: Cost per day = 272.61 ÷ 150 days = $1.82 per day.

III Operating Cost

Total ..... $ 1.82 / day

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2e2)
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION AND HAZARD REDUCTION

Operations- FIRE PROTECTION - PORTABLE PUMP - COST BY SALE SIZE

Reference for Cost Table

I Determining Hourly Cost

A. Machine Rates Machine/Time	Fixed	Operating	Total per day
1. Portable pump			1.94
2. Associated fire equipment			1.82
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 3.76

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Laborer (1 hour/day) - use	12.32	12.32
2. Chaser rate		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 12.32

C. General and Administrative Costs
10% of Machine and Wage Rates

$ _____ x 10%..... $ _____

D. Total Costs ..... $ 16.08

II Misc. Add'l Costs/Adjustments

Adjustment for sale size

	Up to 3MM	3MM to 8MM	8MM and larger
Equipment	$ 3.76	$3.76	$602 (8 mos.)
Wages	$ 12.32	$985.60 (4 mos.)	$1971.20 (8 mos.)
Days of Production	60	---	
Production per Day	---	50M/Day	
Cost per M	9.64.80/3MM		
Total Cost	$.32/M	$985.60 + $.075/M	$2573.20

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C2e2)
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION AND HAZARD REDUCTION

Operations- FIRE PROTECTION - TRAILER MOUNTED PUMP - COST BY SALE SIZE

Reference for Cost Table

I Determining Hourly Cost

A. Machine Rates Machine/Time	Fixed	Operating	Total per day
1. Trailer Mounted Pump - Complete			7.50
2. Associated fire equipment			1.83
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 9.33

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Laborer (1 hour per day)-	12.32	12.32
2. Use Chaser rate		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$_____

C. General and Administrative Costs
10% of Machine and Wage Rates

$ _____ x 10%..... $ _____

D. Total Costs ..... $ _____

II Misc. Add'l Costs/Adjustments

Adjustment for sale size.

	Up to 3MM	3MM to 8MM	8MM and larger
Equipment	$9.33 per day	$9.33 per day	$1493 (8 mos.)
Wages	$12.32 per day	$988.00 (4 mos.)	$1971 (8 mos.)
Days of Production	60 days		
Production per Day		50M/day	
Cost per M	$1299/3MM	$0.19 *	
Total Cost	$0.43	$988 + $0.19/M	$3464

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

* Equipment only
Month = 20 working days

9353.3-PRODUCTION COSTS (C2e2)
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION AND HAZARD REDUCTION

Operations- FIRE PROTECTION - TRUCK MOUNTED PUMP - COST BY SALE SIZE

Reference for Cost Table

I Determining Hourly Cost

A. Machine Rates Machine/Time	Fixed	Operating	Total per day
1. Truck mounted pump - complete			11.17
2. Associated fire equipment			1.83
3.			
4.			
5.			
6.			

Total Machine Rate..... $ 13.00

B. Wage Rates (adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Laborer (1 hour per day)	12.32	12.32
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$_____

C. General and Administrative Costs
10% of Machine and Wage Rates

$ _____ x 10%..... $ _____

D. Total Costs ..... $ _____

II Misc. Add'l Costs/Adjustments

Adjustment for sale size

	Up to 3MM	3MM to 8MM	8MM and larger
Equipment	$13.00/day	$13.00/day	$2080 (8 mos.)
Wages	$12.32/day	$1955.60 (4 mos)	$1971 (8 mos)
Days of Production	60		
Production per Day		50M/day	
Cost per M	$1519.20/3MM	$0.26/M	
Total Cost	$0.51/M	$955.60+0.26/M	$4051

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3 - PRODUCTION COSTS

(Schedule 4)

3. Cost and Production Studies. Summaries of individual time and motion studies are recorded in the following tables. In some cases regression equations for the particular studies are included. Not all BLM logging cost studies nor all components of the included studies have been recorded in this appendix. Only major studies with specific operational times are included. This data is grouped by major functions and referenced to specific cost tables in the schedule.

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Falling & Bucking

Operations - Merchantable Trees

Reference for Cost Table Illustration 1, Table 1

Falling and Bucking Operating Time - Minutes per MBF Gross Volume 1/2/

No. of 16' Logs	Per cent Top Loss										
	0	5	10	15	20	25	30	35	40	45	50
1	46.45	45.98	45.49	45.01	44.52	44.03	43.55	43.06	42.59	42.10	41.61
2	38.00	37.51	37.03	36.55	36.06	35.57	35.10	34.61	34.13	33.64	33.15
3	30.67	30.18	29.71	29.22	28.73	28.25	27.76	27.27	26.80	26.31	25.83
4	24.46	23.98	23.49	23.00	22.53	22.04	21.56	21.07	20.58	20.10	19.61
5	19.38	18.89	18.41	17.92	17.44	16.95	16.46	15.99	15.50	15.01	14.53
6	15.41	14.91	14.45	13.96	13.47	12.99	12.50	12.03	11.54	11.06	10.57
7	12.57	12.08	11.61	11.12	10.64	10.15	9.66	9.18	8.69	8.22	7.73
8	10.85	10.37	9.88	9.41	8.92	8.43	7.95	7.46	6.99	6.50	6.01
9	10.26	9.77	9.30	8.81	8.33	7.84	7.35	6.87	6.38	5.91	5.42

1/ Regression equation:
$Y_c = 33.1054 - 7.2427X_1 + .0692X_2 - .0306X_3 + .4011X_4$
Y = Falling and bucking time per MBF gross volume
X_1 = Number of 16' logs
X_2 = Recovery per cent $\frac{\text{(Gross volume - Top loss)}}{\text{Gross Volume}}$
X_3 = Number of stems per acre
X_4 = Number of 16' logs squared
2/ Miscellaneous delay time of 40% is included in table.

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9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Falling & Bucking

Operations - Unmerchantable Snags and Culls

Reference for Cost Table Illustration 1, Table 2

Operating Time - Time per Stem for Falling Unmerchantable Snags and Green Culls

D.B.H.	Time per Stem 1/
8	2.62
12	4.38
16	6.14
20	7.90
24	9.66
28	11.42
32	13.18
36	14.94
40	16.70
44	18.46
48	20.22
52	21.98
56	23.74
60	25.50
64	27.26
68	29.02
72	30.78
76	32.54
80	34.30
84	36.06
88	37.82
92	39.58
96	41.34
100	43.10

1/ Equation: $Y = .44X - .90$
Y = Time per stem in minutes
X = D.b.h. in inches

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Falling & Bucking

Operations - Commercial Thinnings

Reference for Cost Table Illustration 1, Table 3

Falling and Bucking Operating Time - Minutes per tree

(a) Development of Time Components (from PNW-41)

Walking to tree; regression equation:

$$Y_1 = 2.332 - 0.01033T_1 + 0.0000182(T_1)^2 - 0.01235T_3$$

Where:
Y_1 = Time per tree in minutes
T_1 = Number of trees per acre before cut
T_3 = Number of trees cut per acre

For BLM thinning sale conditions, T_1 average is 170, T_3 average is 51 and Y_1 = 0.472 minute (use as a constant).

Swamping (clearing away of interfering brush and branches): Regression produced a low coefficient of determination. Therefore, the simple mean was used as a constant (PNW-41).

$$Y_2 = 0.21 \text{ minute per tree}$$

Falling, limbing and bucking; regression equation:

$$Y_3 = 1.3805 + 0.01134H^2 + 1.179B$$

Where:
Y_3 = Time per tree in minutes
H = DBH in inches
B = Number of bucking cuts after falling (It is assumed here that a 32-foot log is standard)

Summation equation:

$$Y_4 = Y_1 + Y_2 + Y_3$$

$$= 0.472 + 0.21 + 1.3805 + 0.1134H^2 + 1.179B, \text{ or}$$

$$Y_4 = 2.0625 + 0.1134H^2 + 1.179B$$

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Computed Operating Time - Minutes per Tree

D.B.H. Inches	Number of 32-Foot Logs per Tree 1/					
	1	2	3	4	5	6
8	3.968	5.146				
10	4.376	5.555	6.734			
12	4.875	6.054	7.233			
14	5.465	6.644	7.822	9.001		
16	6.145	7.324	8.503	9.682		
18	6.916	8.095	9.274	10.453		
20	7.778	8.957	10.136	11.315	12.494	
22	8.731	9.910	11.089	12.268	13.446	
24	9.674	10.853	12.032	13.211	14.489	15.668
26	10.908	12.087	13.266	14.445	15.624	16.802
28	12.133	13.312	14.491	15.670	16.849	18.027
30	13.448	14.627	15.806	16.985	18.164	19.343

Falling and Bucking Costs per Tree

These are the products of the adjusted falling and bucking costs per minute and minutes of operating time per tree.

1/ The variable here is actually the number of bucking cuts after falling, with a 32-foot log as standard.

Activity - Rigging, Yarding and Loading
Operations - Tractor Yarding
Reference for Cost Table Illustration 2, Table 2-4 & 13-15

(1) Operating Time for Tractor Yarding - Minutes per MBF Gross Volume Yarded 1/ 2/ 4/

16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 3/																			
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
10	24.71	24.95	25.20	25.44	25.69	25.93	26.18	26.42	26.67	26.91	27.16	27.40	27.65	27.90	28.15	28.38	28.63	28.87	29.12	29.36
12	20.47	20.71	20.96	21.20	21.45	21.69	21.94	22.18	22.43	22.67	22.92	23.16	23.41	23.65	23.90	24.14	24.39	24.63	24.88	25.12
14	17.01	17.26	17.50	17.74	17.99	18.23	18.48	18.72	18.97	19.21	19.46	19.70	19.95	20.19	20.44	20.68	20.93	21.17	21.42	21.66
16	14.18	14.43	14.67	14.92	15.16	15.41	15.65	15.90	16.14	16.39	16.63	16.88	17.12	17.37	17.61	17.86	18.10	18.35	18.59	18.84
18	11.88	12.13	12.37	12.62	12.86	13.11	13.35	13.60	13.84	14.09	14.33	14.58	14.82	15.07	15.31	15.56	15.80	16.05	16.29	16.54
20	10.01	10.26	10.50	10.75	10.99	11.24	11.48	11.73	11.97	12.22	12.46	12.71	12.95	13.20	13.44	13.69	13.93	14.18	14.42	14.67
22	8.49	8.73	8.98	9.22	9.47	9.71	9.96	10.20	10.45	10.69	10.94	11.18	11.43	11.67	11.92	12.16	12.41	12.65	12.90	13.14
24	7.25	7.50	7.74	7.99	8.23	8.48	8.72	8.97	9.21	9.46	9.70	9.95	10.19	10.44	10.68	10.93	11.17	11.42	11.66	11.91
26	6.25	6.50	6.74	6.99	7.23	7.48	7.72	7.97	8.21	8.46	8.70	8.95	9.19	9.44	9.68	9.93	10.17	10.42	10.66	10.91
28	5.44	5.69	5.93	6.18	6.42	6.67	6.91	7.16	7.40	7.65	7.89	8.14	8.38	8.63	8.87	9.12	9.36	9.61	9.85	10.10
30	4.79	5.04	5.28	5.53	5.77	6.02	6.26	6.51	6.75	7.00	7.24	7.49	7.73	7.98	8.22	8.47	8.71	8.96	9.20	9.45
32	4.27	4.51	4.76	5.00	5.25	5.49	5.74	5.98	6.23	6.47	6.72	6.96	7.21	7.45	7.70	7.94	8.19	8.43	8.68	8.92
34	3.85	4.10	4.34	4.59	4.83	5.08	5.32	5.57	5.81	6.06	6.30	6.55	6.79	7.04	7.28	7.53	7.77	8.02	8.26	8.51
36	3.52	3.77	4.01	4.26	4.50	4.75	4.99	5.24	5.48	5.73	5.97	6.22	6.46	6.71	6.95	7.20	7.44	7.69	7.93	8.18
38	3.26	3.51	3.75	4.00	4.24	4.49	4.73	4.98	5.22	5.47	5.71	5.96	6.20	6.45	6.69	6.94	7.18	7.43	7.67	7.92
40	3.06	3.30	3.55	3.79	4.04	4.28	4.53	4.77	5.02	5.26	5.51	5.75	6.00	6.24	6.49	6.73	6.98	7.22	7.47	7.71
42	2.91	3.15	3.40	3.65	3.89	4.13	4.38	4.62	4.87	5.11	5.36	5.60	5.85	6.09	6.34	6.58	6.83	7.07	7.32	7.56
46	2.71	2.95	3.20	3.44	3.69	3.93	4.18	4.42	4.67	4.91	5.16	5.40	5.65	5.89	6.14	6.38	6.63	6.87	7.12	7.36
52	2.59	2.84	3.08	3.33	3.57	3.82	4.06	4.31	4.55	4.80	5.04	5.29	5.53	5.78	6.02	6.27	6.51	6.76	7.00	7.25
66	2.74	2.99	3.23	3.48	3.72	3.97	4.21	4.46	4.70	4.95	5.19	5.44	5.68	5.93	6.17	6.42	6.66	6.91	7.15	7.40
72	2.88	3.13	3.37	3.62	3.86	4.11	4.35	4.60	4.84	5.09	5.33	5.58	5.82	6.07	6.31	6.56	6.80	7.05	7.29	7.54
78	3.04	3.28	3.53	3.77	4.02	4.26	4.51	4.75	5.00	5.24	5.49	5.73	5.98	6.22	6.47	6.71	6.96	7.20	7.45	7.69
84	3.21	3.45	3.70	3.94	4.19	4.43	4.68	4.92	5.17	5.41	5.66	5.90	6.15	6.39	6.64	6.88	7.13	7.37	7.62	7.86
90	3.38	3.62	3.87	4.11	4.36	4.60	4.85	5.09	5.34	5.58	5.83	6.07	6.32	6.56	6.81	7.05	7.30	7.54	7.79	8.03
96	3.55	3.80	4.04	4.29	4.53	4.78	5.02	5.27	5.51	5.76	6.00	6.25	6.49	6.74	6.98	7.23	7.47	7.72	7.96	8.21
100	3.67	3.92	4.16	4.41	4.65	4.90	5.14	5.39	5.63	5.88	6.12	6.37	6.61	6.86	7.10	7.35	7.59	7.84	8.08	8.33

1/ Regression equation:

Y = Time in minutes per MBF 16' logs

Y = $(.3148 + .0035X_1 + .0213X_2 + 46.0659X_3) \times 1.40$

X_1 = Yarding distance in feet

X_2 = Scribner Dec. C log volume in 16 foot log

X_3 = $e^{-.1}$ volume per log, where e is the base of natural logarithms and is equal to 2.7183818+.

2/ Delay and supplemental time of 40% is included in table.

3/ Distance logs actually travel from choker setting point to the landing.

4/ Times are for production of one tractor. As the cost per minute for the tractor operation is based on two tractors, the cost shown under X_3 is halved before multiplying by times.

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9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost and Production Studies

Range of Conditions on Study Areas

(1)	Slope	- 45% downhill to 45% uphill
(2)	Stems per acre	- 23 to 100
(3)	Yarding distance	- 50 to 1490 feet
(4)	Logs per turn	- 1 to 7
(5)	Volume per log	- 72 to 1306
(6)	Number of tractors	- 1 to 3 per side
(7)	Number of choker setters	- 1 or 2 per tractor

Cost and Production Studies

Activity - Rigging, Yarding and Loading

Operations - Tractor Yarding - Partial Cut

Reference for Cost Table Illustration 2, Tables 5.6, 9.15, 17, 18, 19

2) Operating Time for Partial Cut Tractor Yarding Operations in - Minutes per MBF Gross Volume Yarded 1/2

To Fit Log Volume Scribner Scale	Yarding Distance in Feet 3/																			
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
6	51.92	52.38	52.84	53.30	53.76	54.22	54.67	55.13	55.59	56.05	56.51	56.97	57.43	57.89	58.35	58.81	59.26	59.72	60.18	60.64
8	44.29	44.66	45.12	45.58	46.04	46.50	46.96	47.41	47.87	48.33	48.79	49.25	49.71	50.17	50.63	51.09	51.55	52.01	52.46	52.92
10	37.83	38.20	38.76	39.22	39.67	40.13	40.59	41.05	41.51	41.97	42.43	42.89	43.35	43.81	44.28	44.72	45.18	45.64	46.10	46.56
12	32.54	33.04	33.50	33.96	34.42	34.88	35.34	35.80	36.26	36.71	37.17	37.63	38.09	38.55	39.01	39.47	39.93	40.39	40.85	41.30
14	28.24	28.70	29.15	29.61	30.07	30.53	30.99	31.45	31.91	32.37	32.83	33.29	33.75	34.20	34.66	35.12	35.58	36.04	36.50	36.96
16	24.63	25.09	25.55	26.01	26.47	26.93	27.39	27.85	28.31	28.77	29.22	29.68	30.14	30.60	31.06	31.52	31.98	32.44	32.90	33.36
18	21.64	22.10	22.56	23.02	23.48	23.93	24.39	24.85	25.31	25.77	26.23	26.69	27.15	27.61	28.07	28.53	28.84	29.44	29.90	30.36
20	19.14	19.60	20.06	20.52	20.98	21.44	21.90	22.36	22.82	23.28	23.73	24.19	24.65	25.11	25.57	26.03	26.49	26.95	27.41	27.87
22	17.06	17.52	17.97	18.43	18.89	19.35	19.81	20.27	20.73	21.19	21.65	22.11	22.56	23.02	23.48	23.94	24.40	24.86	25.32	25.78
24	15.39	15.76	16.22	16.68	17.14	17.60	18.06	18.52	18.97	19.43	19.89	20.35	20.81	21.27	21.73	22.19	22.65	23.11	23.56	24.02
26	13.82	14.28	14.74	15.20	15.66	16.12	16.58	17.04	17.49	17.95	18.41	18.87	19.33	19.79	20.25	20.71	21.17	21.63	22.08	22.54
28	12.57	13.02	13.48	13.94	14.40	14.86	15.32	15.78	16.24	16.70	17.16	17.62	18.07	18.53	18.99	19.45	19.91	20.37	20.83	21.29
30	11.49	11.95	12.41	12.87	13.33	13.79	14.25	14.71	15.17	15.62	16.08	16.54	17.00	17.46	17.92	18.38	18.84	19.30	19.76	20.21
32	10.57	11.03	11.49	11.95	12.41	12.87	13.32	13.78	14.24	14.70	15.16	15.62	16.08	16.54	17.00	17.46	17.91	18.37	18.83	19.29
34	9.77	10.23	10.69	11.15	11.61	12.07	12.52	12.98	13.44	13.90	14.36	14.82	15.28	15.74	16.20	16.66	17.11	17.57	18.03	18.49
36	9.07	9.53	9.99	10.45	10.91	11.37	11.82	12.28	12.74	13.20	13.66	14.12	14.58	15.04	15.50	15.96	16.42	16.87	17.33	17.79
38	8.45	8.91	9.37	9.83	10.29	10.75	11.21	11.67	12.13	12.59	13.04	13.50	13.96	14.42	14.88	15.34	15.80	16.26	16.72	17.18
40	7.90	8.36	8.82	9.28	9.74	10.20	10.66	11.12	11.58	12.04	12.49	12.95	13.41	13.87	14.33	14.79	15.25	15.71	16.17	16.63
42	7.41	7.87	8.33	8.79	9.25	9.71	10.15	10.62	11.08	11.54	12.00	12.46	12.92	13.38	13.84	14.30	14.75	15.21	15.67	16.13
44	6.96	7.42	7.88	8.34	8.80	9.26	9.72	10.17	10.63	11.09	11.55	12.01	12.47	12.93	13.39	13.85	14.31	14.76	15.22	15.68
46	6.55	7.01	7.47	7.93	8.39	8.84	9.30	9.76	10.22	10.68	11.14	11.60	12.06	12.52	12.98	13.43	13.89	14.35	14.81	15.27
48	6.17	6.63	7.09	7.54	8.00	8.46	8.92	9.38	9.84	10.30	10.76	11.22	11.68	12.13	12.59	13.05	13.51	13.97	14.43	14.89
50	5.81	6.27	6.73	7.19	7.65	8.11	8.56	9.02	9.48	9.94	10.40	10.86	11.32	11.78	12.24	12.70	13.16	13.61	14.07	14.53
52	5.47	5.93	6.39	6.85	7.31	7.77	8.23	8.69	9.15	9.61	10.06	10.52	10.98	11.44	11.90	12.36	12.82	13.28	13.74	14.20
54	5.15	5.61	6.07	6.53	6.99	7.45	7.91	8.37	8.83	9.29	9.74	10.20	10.66	11.12	11.58	12.04	12.50	12.96	13.42	13.88
56	4.85	5.31	5.77	6.22	6.68	7.14	7.60	8.06	8.52	8.98	9.44	9.90	10.35	10.82	11.27	11.73	12.19	12.65	13.11	13.57
58	4.55	5.01	5.47	5.93	6.39	6.85	7.31	7.77	8.22	8.68	9.14	9.60	10.06	10.52	10.98	11.44	11.90	12.36	12.82	13.27
60	4.27	4.73	5.18	5.64	6.10	6.56	7.02	7.48	7.94	8.40	8.86	9.32	9.77	10.23	10.69	11.15	11.61	12.07	12.53	12.99
62	3.99	4.45	4.91	5.37	5.82	6.28	6.74	7.20	7.66	8.12	8.58	9.04	9.50	9.96	10.41	10.87	11.33	11.79	12.25	12.71
64	3.72	4.17	4.63	5.09	5.55	6.01	6.47	6.93	7.39	7.85	8.31	8.76	9.22	9.68	10.14	10.60	11.06	11.52	11.98	12.44
66	3.45	3.91	4.37	4.83	5.28	5.74	6.20	6.66	7.12	7.58	8.04	8.50	8.96	9.42	9.87	10.33	10.79	11.25	11.71	12.17
68	3.18	3.64	4.10	4.56	5.02	5.48	5.94	6.40	6.86	7.32	7.78	8.23	8.69	9.15	9.61	10.07	10.53	10.99	11.45	11.91
70	2.92	3.38	3.84	4.30	4.76	5.22	5.68	6.14	6.60	7.06	7.52	7.97	8.43	8.89	9.35	9.81	10.27	10.73	11.19	11.65

For footnotes 1/, 2/, and 3/, and 6 - see next page.

Percent Slope 5/	Number of Merchantable Stems Marked Per Acre 4/													
	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-1.30	-1.56	-1.83	-2.09	-2.35	-2.61	-2.87	-3.13	-3.39	-3.65	-3.91	-4.17	-4.43	-4.69
5	-0.57	-0.83	-1.09	-1.35	-1.61	-1.87	-2.14	-2.40	-2.66	-2.92	-3.18	-3.44	-3.70	-3.96
10	0.16	-0.10	-0.36	-0.62	-0.88	-1.14	-1.40	-1.66	-1.92	-2.18	-2.44	-2.71	-2.97	-3.23
15	0.90	0.64	0.38	0.11	-0.15	-0.41	-0.67	-0.93	-1.19	-1.45	-1.71	-1.97	-2.23	-2.49
20	1.63	1.37	1.11	0.85	0.59	0.33	0.07	-0.19	-0.46	-0.72	-0.98	-1.24	-1.50	-1.76
25	2.37	2.10	1.84	1.58	1.32	1.06	0.80	0.54	0.28	0.02	-0.24	-0.50	-0.76	-1.03
30	3.10	2.84	2.58	2.32	2.06	1.79	1.53	1.27	1.01	0.75	0.49	0.23	-0.03	-0.29
35	3.83	3.57	3.31	3.05	2.79	2.53	2.27	2.01	1.75	1.49	1.22	0.96	0.70	0.44
40	4.57	4.31	4.05	3.78	3.52	3.26	3.00	2.74	2.48	2.22	1.96	1.70	1.44	1.18
45	5.30	5.04	4.78	4.52	4.26	4.00	3.74	3.47	3.21	2.95	2.69	2.43	2.17	1.91
50	6.03	5.77	5.51	5.25	4.99	4.73	4.47	4.21	3.95	3.69	3.43	3.17	2.90	2.64
55	6.77	6.51	6.25	5.99	5.73	5.46	5.20	4.94	4.68	4.42	4.16	3.90	3.64	3.38
60	7.50	7.24	6.98	6.72	6.46	6.20	5.94	5.68	5.42	5.15	4.89	4.63	4.37	4.11

1/ Regression equation:

$Y = (9.3167 - 0.1040X_1 + 63.8283X_2 + 0.0078X_3) \times 1.177$

X_1 = Scribner Decimal C volume per 16-foot log

$X_2 = e^{-.1X_1}$, where e is the base of natural logarithms and is equal to 2.7183

X_3 = Yarding distance (straight line, slope distance)

2/ Delay and supplemental time of 17.7% is included in the table.

3/ Yarding distance is the average straight line slope distance from choker setting point to the landing. Do not add a factor for weave.

4/ Marked Stems - This is the number of merchantable stems marked per acre within the yarding area

5/ Slope - This is the average slope in per cent of the area being logged as estimated by the cruiser.

6/ Times are for production of one tractor. Costs applied must be on the same base.

Loading Times. The operating times used to develop tractor loading tables are the same as the operating times for partial cut tractor yarding, as the loading production is limited to the production of the yarding operation.

Reference for Cost Table Illustration 2, Tables 11 & 12

(3) Operating Time for Tractor Yarding — Minutes per MBF 1/ 2/ 5/

Slope & Volume Distrib. Dec.C.	Yarding Distance in Feet 3/																			
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
4	19.29	19.51	19.73	19.95	20.17	20.39	20.61	20.83	21.05	21.27	21.49	21.71	21.93	22.15	22.37	22.59	22.81	23.03	23.25	23.47
6	18.29	18.51	18.73	18.95	19.17	19.39	19.61	19.83	20.05	20.27	20.49	20.71	20.93	21.15	21.37	21.59	21.81	22.03	22.25	22.47
8	17.32	17.54	17.76	17.98	18.20	18.42	18.64	18.86	19.08	19.30	19.52	19.74	19.96	20.18	20.40	20.62	20.84	21.06	21.28	21.50
10	16.47	16.69	16.81	17.03	17.25	17.47	17.69	17.91	18.13	18.35	18.57	18.79	19.01	19.23	19.45	19.67	19.89	20.11	20.33	20.55
12	15.45	15.67	15.89	16.11	16.33	16.55	16.77	16.99	17.21	17.43	17.65	17.87	18.09	18.31	18.53	18.75	18.97	19.19	19.41	19.63
14	14.55	14.77	14.99	15.21	15.43	15.65	15.87	16.09	16.31	16.53	16.75	16.97	17.19	17.41	17.63	17.85	18.07	18.29	18.51	18.73
16	13.67	13.89	14.11	14.33	14.55	14.77	14.99	15.21	15.43	15.65	15.87	16.09	16.31	16.53	16.75	16.97	17.19	17.41	17.63	17.85
18	12.83	13.05	13.27	13.49	13.71	13.93	14.15	14.37	14.59	14.81	15.03	15.25	15.47	15.69	15.91	16.13	16.35	16.57	16.79	17.01
20	12.09	12.22	12.44	12.66	12.88	13.10	13.32	13.54	13.76	13.98	14.20	14.42	14.64	14.86	15.08	15.30	15.52	15.74	15.96	16.18
22	11.20	11.42	11.64	11.86	12.08	12.30	12.52	12.74	12.96	13.18	13.40	13.62	13.84	14.06	14.28	14.50	14.72	14.94	15.16	15.38
24	10.43	10.65	10.87	11.09	11.31	11.53	11.75	11.97	12.19	12.41	12.63	12.85	13.07	13.29	13.51	13.73	13.95	14.17	14.39	14.61
26	9.68	9.90	10.12	10.34	10.56	10.78	11.00	11.22	11.44	11.66	11.88	12.10	12.32	12.54	12.76	12.98	13.20			
28	8.95	9.17	9.39	9.61	9.83	10.05	10.27	10.49	10.71	10.93	11.15	11.37	11.59	11.81	12.03	12.25	12.47			
30	8.25	8.47	8.69	8.91	9.13	9.35	9.57	9.79	10.01	10.23	10.45	10.67	10.89	11.11	11.33	11.55	11.77			
32	7.58	7.80	8.02	8.24	8.46	8.68	8.90	9.12	9.34	9.56	9.78	10.00	10.22							
34	6.93	7.15	7.37	7.59	7.81	8.03	8.25	8.47	8.69	8.91	9.13	9.35	9.57							
36	6.30	6.52	6.74	6.96	7.18	7.40	7.62	7.84	8.06											
38	5.70	5.92	6.14	6.36	6.58	6.80	7.02	7.24	7.46											
40	5.13	5.35	5.57	5.79	6.01	6.23	6.45	6.67	6.89											
44	4.05	4.27	4.49	4.71	4.93															

1/ Regression equation:
Y = Time in minutes
Y = $21.1374 + .0044X_1 - .5298X_2 + .0031X_3$
X_1 = Distance in feet
X_2 = Volume of average log in Dec. C - 28 ft. logs
X_3 = $(X_2)^2$

2/ Supplemental time of 24.4% is included in table (included in above equation).

3/ Distance logs actually travel from choker setting point to the landing.

4/ Volume factor of .571 was used to adjust 28 ft. logs to 16 ft. logs.

5/ Times are for production of one tractor. As the cost per minute for the tractor operation is based on two tractors, the cost shown in Illustration 2, Tables 10 and 11.

(4) Operating Time for High-lead Yarding - Minutes per MBF Gross Volume Yarded 1/ 2/

16 Ft. Log 3/ Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet																				
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
10	15.73	16.10	16.46	16.83	17.20	17.57	17.94	18.30	18.67	19.04	19.41	19.77	20.14	20.51	20.88	21.24	21.61	21.98	22.35	22.71
12	12.11	12.47	12.84	13.21	13.58	13.94	14.31	14.68	15.05	15.41	15.78	16.15	16.52	16.88	17.25	17.62	17.99	18.36	18.72	19.09
14	9.67	10.04	10.41	10.78	11.14	11.51	11.88	12.25	12.61	12.98	13.35	13.72	14.08	14.45	14.82	15.19	15.55	15.92	16.29	16.66
16	8.04	8.41	8.77	9.14	9.51	9.88	10.24	10.61	10.98	11.35	11.71	12.08	12.45	12.82	13.19	13.55	13.92	14.29	14.66	15.02
18	6.94	7.31	7.67	8.04	8.41	8.78	9.15	9.51	9.88	10.25	10.62	10.98	11.35	11.72	12.09	12.45	12.82	13.19	13.56	13.92
20	6.20	6.57	6.93	7.30	7.67	8.04	8.40	8.77	9.14	9.51	9.87	10.24	10.61	10.98	11.35	11.71	12.08	12.45	12.82	13.18
22	5.70	6.07	6.43	6.80	7.17	7.54	7.90	8.27	8.64	9.01	9.37	9.74	10.11	10.48	10.84	11.21	11.58	11.95	12.32	12.68
24	5.36	5.73	6.09	6.46	6.83	7.20	7.57	7.93	8.30	8.67	9.04	9.40	9.77	10.14	10.51	10.87	11.24	11.61	11.98	12.34
26	5.13	5.50	5.86	6.23	6.60	6.97	7.33	7.70	8.07	8.44	8.80	9.17	9.54	9.91	10.28	10.64	11.01	11.38	11.75	12.11
28	4.97	5.34	5.71	6.07	6.44	6.81	7.18	7.54	7.91	8.28	8.65	9.01	9.38	9.75	10.12	10.48	10.85	11.22	11.59	11.95
30	4.86	5.23	5.60	5.96	6.33	6.70	7.07	7.43	7.80	8.17	8.54	8.90	9.27	9.64	10.01	10.37	10.74	11.11	11.48	11.84
32	4.78	5.15	5.52	5.89	6.25	6.62	6.99	7.36	7.72	8.09	8.46	8.83	9.19	9.56	9.93	10.30	10.66	11.03	11.40	11.77
34	4.73	5.09	5.46	5.83	6.20	6.57	6.93	7.30	7.67	8.04	8.40	8.77	9.14	9.51	9.87	10.24	10.61	10.98	11.34	11.71
36	4.69	5.05	5.42	5.79	6.16	6.52	6.89	7.26	7.63	7.99	8.36	8.73	9.10	9.46	9.83	10.20	10.57	10.94	11.30	11.67
38	4.65	5.02	5.39	5.76	6.13	6.49	6.86	7.23	7.60	7.96	8.33	8.70	9.07	9.43	9.80	10.17	10.54	10.90	11.27	11.64
40	4.63	5.00	5.37	5.73	6.10	6.47	6.84	7.20	7.57	7.94	8.31	8.67	9.04	9.41	9.78	10.14	10.51	10.88	11.25	11.61
42	4.61	4.98	5.35	5.71	6.08	6.45	6.82	7.18	7.55	7.92	8.29	8.65	9.02	9.39	9.76	10.12	10.49	10.86	11.23	11.59
44	4.59	4.96	5.33	5.70	6.06	6.43	6.80	7.17	7.53	7.90	8.27	8.64	9.00	9.37	9.74	10.11	10.47	10.84	11.21	11.58
46	4.58	4.94	5.31	5.68	6.05	6.42	6.78	7.15	7.52	7.89	8.25	8.62	8.99	9.36	9.72	10.09	10.46	10.83	11.19	11.56
48	4.56	4.93	5.30	5.67	6.03	6.40	6.77	7.14	7.50	7.87	8.24	8.61	8.97	9.34	9.71	10.08	10.44	10.81	11.18	11.55
50	4.55	4.92	5.29	5.65	6.02	6.39	6.76	7.12	7.49	7.86	8.23	8.59	8.96	9.33	9.70	10.06	10.43	10.80	11.17	11.53
52	4.54	4.91	5.27	5.64	6.01	6.38	6.74	7.11	7.48	7.85	8.21	8.58	8.95	9.32	9.68	10.05	10.42	10.79	11.15	11.52
54	4.53	4.89	5.26	5.63	6.00	6.36	6.73	7.10	7.47	7.83	8.20	8.57	8.94	9.30	9.67	10.04	10.41	10.77	11.14	11.51
56	4.51	4.88	5.25	5.62	5.98	6.35	6.72	7.09	7.45	7.82	8.19	8.56	8.92	9.29	9.66	10.03	10.40	10.76	11.13	11.50
58	4.50	4.87	5.24	5.60	5.97	6.34	6.71	7.08	7.44	7.81	8.18	8.55	8.91	9.28	9.65	10.02	10.38	10.75	11.12	11.49
60	4.49	4.86	5.23	5.59	5.96	6.33	6.70	7.06	7.43	7.80	8.17	8.53	8.90	9.27	9.64	10.00	10.37	10.74	11.11	11.47
62	4.48	4.85	5.21	5.58	5.95	6.32	6.68	7.05	7.42	7.79	8.16	8.52	8.89	9.26	9.63	9.99	10.36	10.73	11.10	11.46
64	4.47	4.84	5.20	5.57	5.94	6.31	6.67	7.04	7.41	7.78	8.14	8.51	8.88	9.25	9.61	9.98	10.35	10.72	11.08	11.45
66	4.46	4.82	5.19	5.56	5.93	6.29	6.66	7.03	7.40	7.76	8.13	8.50	8.87	9.24	9.60	9.97	10.34	10.71	11.07	11.44
68	4.45	4.81	5.18	5.55	5.92	6.28	6.65	7.02	7.39	7.75	8.12	8.49	8.86	9.22	9.59	9.96	10.33	10.69	11.06	11.43
70	4.43	4.80	5.17	5.54	5.90	6.27	6.64	7.01	7.37	7.74	8.11	8.48	8.84	9.21	9.58	9.95	10.32	10.68	11.05	11.42
72	4.42	4.79	5.16	5.53	5.89	6.26	6.63	7.00	7.36	7.73	8.10	8.47	8.83	9.20	9.57	9.94	10.30	10.67	11.04	11.41
74	4.41	4.78	5.15	5.51	5.88	6.25	6.62	6.98	7.35	7.72	8.09	8.45	8.82	9.19	9.56	9.92	10.29	10.66	11.03	11.40
76	4.40	4.77	5.13	5.50	5.87	6.24	6.61	6.97	7.34	7.71	8.08	8.44	8.81	9.18	9.55	9.91	10.28	10.65	11.02	11.38
78	4.39	4.76	5.12	5.49	5.86	6.23	6.59	6.96	7.33	7.70	8.06	8.43	8.80	9.17	9.53	9.90	10.27	10.64	11.01	11.37

Operating Time for High-lead Yarding - Minutes per MBF Gross Volume Yarded 1/ 2/ (contd.)

16 Ft. Log 3/ Volume Scrib. Dec. C.	Yarding (Slope) Distance in Feet																			
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
80	4.38	4.74	5.11	5.48	5.85	6.22	6.58	6.95	7.32	7.69	8.05	8.42	8.79	9.16	9.52	9.89	10.26	10.63	10.99	11.36
82	4.37	4.73	5.10	5.47	5.84	6.20	6.57	6.94	7.31	7.67	8.04	8.41	8.78	9.14	9.51	9.88	10.25	10.61	10.98	11.35
84	4.35	4.72	5.09	5.46	5.82	6.19	6.56	6.93	7.30	7.66	8.03	8.40	8.77	9.13	9.50	9.87	10.24	10.60	10.97	11.34
86	4.34	4.71	5.08	5.45	5.81	6.18	6.55	6.92	7.28	7.65	8.02	8.39	8.75	9.12	9.49	9.86	10.22	10.59	10.96	11.33
88	4.33	4.70	5.07	5.43	5.80	6.17	6.54	6.91	7.27	7.64	8.01	8.38	8.74	9.11	9.48	9.85	10.21	10.58	10.95	11.32
90	4.32	4.69	5.06	5.42	5.79	6.16	6.53	6.89	7.26	7.63	8.00	8.36	8.73	9.10	9.47	9.83	10.20	10.57	10.94	11.30

1/ Regression equation:
Y = Time in minutes
Y = (3.62719 - .00229$6X_1$ + .005977X_2 + 65.824028X_3) x 1.23
X_1 = Scribner Decimal C log volume in woods length logs
X_2 = Yarding distance in feet
X_3 = e^{-1} Volume per log, where e is the base of natural logarithms and is equal to 2.7182818+.
2/ Delay and supplemental time of 23% is included in table.
3/ Volume factor .5 was used to adjust woods length logs to 16 foot logs.

Range of Conditions on High-lead Study Areas.

(1) Volume per log - 30 board feet to 6,120 board feet
(2) Line slope - minus 35% to plus 65%
(3) Stems per acre - 26 to 74
(4) Yarding distance - 100 feet to 1,350 feet

Loading Times. The operating times used to develop high-lead loading tables are the same as the operating times for high-lead yarding as the loading production is limited to the production of the yarding operation.

(5) OPERATION TIME FOR STATIC SKYLINE YARDING IN CLEAR CUTS (USING RADIO-CONTROLLED SKYCAR)

MINUTES PER M8F GROSS VOLUME YARDED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC. C.	YARDING (SLOPE) DISTANCE IN FEET													
	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
10	9.33	9.47	9.63	9.81	10.02	10.26	10.52	10.80	11.11	11.44	11.80	12.18	12.59	13.02
12	7.26	7.39	7.55	7.74	7.95	8.18	8.44	8.73	9.04	9.37	9.73	10.11	10.52	10.95
14	5.87	6.00	6.17	6.35	6.56	6.79	7.05	7.34	7.65	7.98	8.34	8.72	9.13	9.56
16	4.94	5.07	5.23	5.42	5.63	5.86	6.12	6.41	6.71	7.05	7.41	7.79	8.20	8.63
18	4.31	4.45	4.61	4.79	5.00	5.24	5.50	5.78	6.09	6.42	6.78	7.16	7.57	8.00
20	3.19	4.03	4.19	4.38	4.59	4.82	5.08	5.36	5.67	6.01	6.36	6.75	7.15	7.59
22	3.61	3.75	3.91	4.10	4.31	4.54	4.80	5.08	5.39	5.72	6.08	6.47	6.87	7.30
24	3.43	3.56	3.72	3.91	4.12	4.35	4.61	4.90	5.20	5.54	5.89	6.28	6.68	7.12
26	3.30	3.44	3.60	3.78	3.99	4.23	4.49	4.77	5.08	5.41	5.77	6.15	6.56	6.99
28	3.22	3.35	3.51	3.70	3.91	4.14	4.40	4.68	4.99	5.33	5.68	6.07	6.47	6.91
30		3.29	3.46	3.64	3.85	4.08	4.34	4.63	4.94	5.27	5.63	6.01	6.42	6.85
32		3.26	3.42	3.60	3.81	4.05	4.31	4.59	4.90	5.23	5.59	5.97	6.38	6.81
34		3.23	3.39	3.58	3.79	4.02	4.28	4.56	4.87	5.21	5.56	5.95	6.35	6.79
36		3.21	3.37	3.56	3.77	4.00	4.26	4.55	4.86	5.19	5.55	5.93	6.34	6.77
38		3.20	3.36	3.55	3.76	3.99	4.25	4.54	4.84	5.18	5.54	5.92	6.33	6.76
40			3.36	3.54	3.75	3.99	4.24	4.53	4.84	5.17	5.53	5.91	6.32	6.75
45			3.35	3.53	3.74	3.98	4.23	4.52	4.83	5.16	5.52	5.90	6.31	6.74
50			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.16	5.51	5.90	6.30	6.74
55			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.16	5.51	5.90	6.30	6.74
60			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73
65			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73
70			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73
75			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73
80			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73
85			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73

1/ REGRESSION EQUATION: $(-.2 \times V)$

YARDING TIME (MIN.) PER M8F = 1.215 X (2.2513 + 0.00010159 X SLOPE DIST. SQ. + 38.235550 X E)

E = THE BASE OF NATURAL LOGARITHMS AND IS EQUAL TO 2.7183.

V = SCRIB. DEC. C. VOLUME PER 16 FT. LOG.

2/ DELAY TIME OF 21.5 PER CENT IS INCLUDED IN THE ABOVE TABLE.

(2) OPERATION TIME FOR STATIC SKYLINE YARDING IN CLEAR CUTS (USING RADIO-CONTROLLED SKYCAR)

MINUTES PER MBF GROSS VOLUME YARDED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.C.	YARDING (SLOPE) DISTANCE IN FEET													
	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200
10	13.48	13.96	14.47	15.00	15.55	16.13	16.74	17.37	18.02	18.70	19.40	20.13	20.88	21.66
12	11.41	11.49	12.39	12.92	13.48	14.06	14.66	15.29	15.95	16.63	17.33	18.06	18.81	19.59
14	10.02	10.50	11.00	11.53	12.09	12.67	13.27	13.90	14.56	15.24	15.94	16.67	17.42	18.20
16	9.06	9.57	10.07	10.60	11.16	11.74	12.34	12.97	13.63	14.31	15.01	15.74	16.49	17.27
18	8.46	8.94	9.45	9.98	10.53	11.11	11.72	12.35	13.01	13.68	14.39	15.11	15.87	16.64
20	8.04	8.52	9.03	9.56	10.12	10.70	11.30	11.93	12.58	13.26	13.97	14.69	15.45	16.23
22	7.76	8.24	8.75	9.28	9.84	10.42	11.02	11.65	12.30	12.93	13.69	14.41	15.17	15.94
24	7.57	8.05	8.56	9.09	9.65	10.23	10.83	11.46	12.12	12.79	13.50	14.23	14.98	15.76
26	7.45	7.93	8.43	8.97	9.52	10.10	10.71	11.34	11.99	12.67	13.37	14.10	14.85	15.63
28	7.36	7.84	8.35	8.88	9.44	10.02	10.62	11.25	11.91	12.58	13.29	14.02	14.77	15.55
30	7.31	7.79	8.29	8.82	9.38	9.96	10.56	11.19	11.85	12.53	13.23	13.96	14.71	15.49
32	7.27	7.75	8.26	8.79	9.34	9.92	10.53	11.16	11.81	12.49	13.19	13.92	14.67	15.45
34	7.24	7.72	8.23	8.76	9.32	9.90	10.50	11.13	11.79	12.46	13.17	13.90	14.65	15.43
36	7.23	7.71	8.21	8.74	9.30	9.88	10.48	11.11	11.77	12.45	13.15	13.88	14.63	15.41
38	7.21	7.70	8.20	8.73	9.29	9.87	10.47	11.10	11.76	12.44	13.14	13.87	14.62	15.40
40	7.21	7.69	8.19	8.72	9.28	9.86	10.47	11.09	11.75	12.43	13.13	13.86	14.61	15.39
45	7.20	7.68	8.18	8.72	9.27	9.85	10.46	11.08	11.74	12.42	13.12	13.85	14.60	15.38
50	7.19	7.67	8.18	8.71	9.27	9.85	10.45	11.08	11.74	12.41	13.12	13.85	14.60	15.38
55	7.19	7.67	8.18	8.71	9.27	9.85	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.38
60	7.19	7.67	8.18	8.71	9.27	9.85	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
65	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
70	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
75	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
80	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
85	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37

1/ REGRESSION EQUATION:

$$\text{YARDING TIME (MIN.) PER MBF} = 1.215 \times (2.2513 + 3.00010159 \times \text{SLOPE DIST. SQ.} + 38.235550 \times E^{(-.2 \times V)})$$

E = THE BASE OF NATURAL LOGARITHMS AND IS EQUAL TO 2.7183.

V = SCRIB. DEC. C. VOLUME PER 16 FT. LOG.

2/ DELAY TIME OF 21.5 PER CENT IS INCLUDED IN THE ABOVE TABLE.

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Rigging, Yarding and Loading

Operations - Skyline Yarding

Reference for Cost Table Illustration 2, Tables 31 & 32

Range of Conditions on Skyline Study Areas

(a) Volume per log (in terms of 16 foot segments of log lengths actually yarded)- 37 board feet to 1,252 board feet (downhill yarding); 19 board feet to 1,727 board feet (uphill yarding).
(b) Number of 16 foot logs per log length actually yarded - 0.8 to 6 (downhill yarding); 0.5 to 5 (uphill yarding).
(c) Skyline slope (on chord) - minus 10% (downhill yarding) to plus 50% (uphill yarding).
(d) Lateral slope (at right angles to skyline) - minus 90% to plus 100%.
(e) Yarding distance (along average ground slope) - 100 feet to 2,450 feet.
(f) Lateral skidding distance - 0 to 250 feet.
(g) Skyline road widths: average - 150 feet
maximum - 400 feet

(6) Operating Time for Light Yarder-Loader - Minutes per MBF Gross Volume 1/ 2/

16' Log Volume Scrib. Dec. C. 3/	Yarding Distance in Feet									
	50	100	150	200	250	300	350	400	450	500
4	27.27	28.28	29.30	30.31	31.32	32.34	33.35	34.36	35.38	36.39
6	25.89	26.91	27.92	28.93	29.95	30.96	31.97	32.99	34.00	35.01
8	24.54	25.55	26.57	27.58	28.59	29.61	30.62	31.63	32.65	33.66
10	23.22	24.23	25.24	26.26	27.27	28.28	29.30	30.31	31.32	32.34
12	21.92	22.93	23.95	24.96	25.97	26.99	28.00	29.01	30.03	31.04
14	20.65	21.66	22.68	23.69	24.70	25.72	26.73	27.74	28.75	29.77
16	19.40	20.42	21.43	22.44	23.46	24.47	25.48	26.50	27.51	28.52
18	18.19	19.20	20.21	21.23	22.24	23.25	24.27	25.28	26.29	27.31
20	17.00	18.01	19.02	20.04	21.05	22.06	23.08	24.09	25.10	26.12
22	15.83	16.85	17.86	18.87	19.89	20.90	21.91	22.93	23.94	24.95
24	14.70	15.71	16.72	17.74	18.75	19.76	20.78	21.79	22.80	23.81
26	13.59	14.60	15.61	16.63	17.64	18.65	19.66	20.68	21.69	22.70
28	12.50	13.52	14.53	15.54	16.55	17.57	18.58	19.59	20.61	21.62
30	11.45	12.46	13.47	14.48	15.50	16.51	17.52	18.54	19.55	20.56
32	10.41	11.43	12.44	13.45	14.47	15.48	16.49	17.51	18.52	19.53
34	9.41	10.42	11.44	12.45	13.46	14.48	15.49	16.50	17.52	18.53
36	8.43	9.45	10.46	11.47	12.49	13.50	14.51	15.53	16.54	17.55
38	7.48	8.50	9.51	10.52	11.54	12.55	13.56	14.58	15.59	16.60
40	6.56	7.57	8.59	9.60	10.61	11.63	12.64	13.65	14.67	15.68
44	4.80	5.81	6.82	7.84	8.85	9.86	10.87	11.89	12.90	13.91
48	3.14	4.15	5.16	6.18	7.19	8.20	9.22	10.23	11.24	12.26
52		2.60	3.61	4.62	5.64	6.65	7.66	8.68	9.69	10.70
56				3.18	4.19	5.20	6.22	7.23	8.24	9.26
60					2.85	3.87	4.88	5.89	6.91	7.92
64						2.64	3.65	4.66	5.68	6.69
68							2.52	3.54	4.55	5.56

1/ Regression equation:

Y = Time in minutes

Y = $(24.7181 + .017217X_1 - .306850X_2 + .000710X_3) \times 1.177$

X_1 = Yarding distance in feet

X_2 = Scribner Dec. C log volume in 32 foot logs

X_3 = Scribner Dec. C 32-foot log volume squared

2/ Delay and supplemental time of 17.7% is included in table

3/ Volume factor of .5 was used to adjust 32 ft. logs to 16 ft. logs.

BLM Manual Supplement
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Supersedes

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Rigging, Yarding and Loading

Operations - Commercial Thinnings - Yarding With Light Crawler Tractor

Reference for Cost Table Illustration 2, Table 45

Operating Time for Light Crawler Tractor Yarding

Development of Time Components

(a) Regression equations (from PNW-41)

i. Outrun time empty:

$Y = 1.341 + 0.004136D$

ii. Choker setting time:

$Y = -1.084 + 2.650N - 0.004775NT_1 + 0.00004951(T_1)^2$ 1/

iii. Skidding time:

$Y = 1.220 + 0.007678D$ 2/

iv. Unhooking and decking time:

$Y = 0.6392 + 0.001421V_2 + 0.0485N^2$ 1/

Where:

Y = Time per turn of logs in minutes
D = Slope distance in feet
N = Number of logs per turn
T_1 = Number of trees per acre before cut
V_2 = Volume per turn in board feet, Scribner (long log scale)

1/ Tractor operator setting and releasing chokers (no extra man).
2/ Equation incorporates possibility that poles over 48 feet in length may be skidded.

v. Summation equation: For BLM commercial thinning sale conditions, T_1 averages 170. In the choker setting time formula, 0.004775NT, then becomes a constant of 0.81175N, and $0.00004951(T_1)^2$ becomes a constant of 1.43090. Combining all equations with these constants, the summation equation for the complete skidding cycle is:

$$Y = 3.5470 + 0.011814D + 1.8382N + 0.048N^2 + 0.001421V_2$$

Computed Operating Time - Minutes per Turn, Light Crawler Tractor Yarding

Vol. per Turn-Bd.Ft. Scrib. Short Log Scale	Vol. Ave. Log 1/ - Bd. Ft. Scribner Short Log Scale	Long Log Scale	No. of 2/ Logs per Turn	Yarding Distance in Feet 3/ 50	100	150	200	250	300	350	400	450	500
200	20	20	10.0	27.65	28.25	28.84	29.43	30.02	30.61	31.20	31.79	32.38	32.97
400	40	40	10.0	27.94	28.53	29.12	29.71	30.30	30.89	31.48	32.07	32.66	33.25
700	70	60	10.0	28.22	28.81	29.40	29.99	30.59	31.18	31.77	32.36	32.95	33.54
1000	100	80	10.0	28.51	29.10	29.69	30.28	30.87	31.46	32.05	32.64	33.23	33.82
1200	120	100	10.0	28.79	29.38	29.97	30.56	31.15	31.74	32.34	32.93	32.52	34.11
1400	140	120	10.0	29.08	29.67	30.26	30.85	31.44	32.03	32.62	33.21	33.80	34.39
1700	170	140	10.0	29.36	29.95	30.54	31.13	31.72	32.31	32.90	33.49	34.09	34.68
1786	190	160	9.4	27.84	28.43	29.02	29.61	30.20	30.79	31.38	31.97	32.57	33.16
1826	220	180	8.3	24.86	25.45	26.04	26.63	27.22	27.81	28.40	28.99	29.58	30.18
1768	250	220	6.8	21.01	21.60	22.19	22.78	23.37	23.96	24.55	25.14	25.73	26.32
1740	300	260	5.8	18.57	19.16	19.76	20.35	20.94	21.53	22.12	22.71	23.30	23.89
1700	340	300	5.0	16.67	17.26	17.85	18.45	19.04	19.63	20.22	20.81	21.40	21.99
1739	370	320	4.7	15.99	16.58	17.17	17.76	18.35	18.94	19.53	20.12	20.71	21.30
1716	390	340	4.4	15.29	15.88	16.47	17.06	17.65	18.24	18.83	19.43	20.02	20.61
1677	430	380	3.9	14.15	14.74	15.33	15.92	16.51	17.10	17.69	18.29	18.88	19.47
1700	500	440	3.4	13.07	13.66	14.26	14.85	15.44	16.03	16.62	17.21	17.80	18.39
1586	610	560	2.6	11.31	11.90	12.50	13.09	13.68	14.27	14.86	15.45	16.04	16.63
1650	660	600	2.5	11.17	11.76	12.35	12.94	13.53	14.12	14.71	15.30	15.89	16.48

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for Douglas-fir subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.
2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.
3/ Distance logs actually travel from choker setting point to landing.

Activity - Rigging, Yarding and Loading - Using 1 Skyline Crawler Tractor
Operations - Commercial Thinnings - Yarding Logs to Skyline Crawler Tractor
References for Cost Table - Illustration 2, Table 5

Computed Operating Time - Minutes per Turn, Light Crawler Tractor Yarding (Contd.)

Vol. per Turn-Bd.Ft. Scrib. Short Log Scale	Vol. Ave. Log 1/ - Bd. Ft. Scribner Short Log Scale	Long Log Scale	No. of 2/ Logs per Turn	Yarding Distance in Feet 3/ 550	600	650	700	750	800	850	900	950	1000
200	20	20	10.0	33.56	34.15	34.74	35.33	35.92	36.51	37.11	37.70	38.29	38.88
400	40	40	10.0	33.85	34.44	35.03	35.62	36.21	36.80	37.39	37.98	38.57	39.16
700	70	60	10.0	34.13	34.72	35.31	35.90	36.49	37.08	37.67	38.26	38.86	39.45
1000	100	80	10.0	34.41	35.00	35.60	36.19	36.78	37.37	37.96	38.55	39.14	39.73
1200	120	100	10.0	34.70	35.29	35.88	36.47	37.06	37.65	38.24	38.83	39.42	40.01
1400	140	120	10.0	34.98	35.57	36.16	36.75	37.35	37.94	38.53	39.12	39.71	40.30
1700	170	140	10.0	35.27	35.86	36.45	37.04	37.63	38.22	38.81	39.40	39.99	40.58
1786	190	160	9.4	33.75	34.34	34.93	35.52	36.11	36.70	37.29	37.88	38.47	39.06
1826	220	180	8.3	30.77	31.36	31.95	32.54	33.13	33.72	34.31	34.90	35.49	36.08
1768	260	220	6.8	26.91	27.50	28.09	28.69	29.28	29.87	30.46	31.05	31.64	32.23
1740	300	260	5.8	24.48	25.07	25.66	26.25	26.84	27.43	28.03	28.62	29.21	29.80
1700	340	300	5.0	22.58	23.17	23.76	24.35	24.94	25.53	26.12	26.71	27.31	27.90
1739	370	320	4.7	21.89	22.48	23.07	23.67	24.26	24.85	25.44	26.03	26.62	27.21
1716	390	340	4.4	21.20	21.79	22.38	22.97	23.56	24.15	24.74	25.33	25.92	26.51
1677	430	380	3.9	20.06	20.65	21.24	21.83	22.42	23.01	23.60	24.19	24.78	25.37
1700	500	440	3.4	18.98	19.57	20.16	20.75	21.34	21.93	22.53	23.12	23.71	24.30
1586	610	560	2.6	17.22	17.81	18.40	18.99	19.58	20.17	20.77	21.36	21.95	22.54
1650	660	600	2.5	17.07	17.67	18.26	18.85	19.44	20.03	20.62	21.21	21.80	22.39

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for Douglas-fir subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.
2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.
3/ Distance logs actually travel from choker setting point to landing.

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Rigging, Yarding and Loading

Operations - Commercial Thinnings - Yarding With 4-Wheel Skidder

Reference for Cost Table Illustration 2, Table 46

Operating Time for Rubber-tired Skidder Yarding

Development of Time Components

Regression equations (from PNW-41)

Outrun time empty:

$$Y = 0.8534 + 0.002951D$$

Choker setting time:

$$Y = 1.230 + 0.6952N + 0.002431NT_1$$

Skidding time:

$$Y = 0.04807 + 0.003502D - 0.000001096D^2 + 0.001777V_2 + 0.003079T_2$$

Unhooking and decking time:

$$Y = 1.054 + 0.2627N$$

Where:

Y = Time per turn of logs, in minutes
D = Slope distance in feet
N = Number of logs per turn
T_1 = Number of trees per acre before cut
T_2 = Number of trees per acre after cut
V_2 = Volume per turn in board feet, Scribner (long log scale)

v. Summation equation: For BLM commercial thinning sale conditions, T_1 averages 170 and T_2 averages 119. In the choker setting time formula, $0.00243NT_1$ then becomes a constant of 0.4132TN. In the skidding time formula, $0.003079T_2$ then becomes a constant of 0.36640. Combining all equations with these constants, the summation equation for the complete skidding cycle is:

$$Y = 3.35187 + 1.3712N + 0.006453D - 0.000001096D^2 + 0.001777T_2$$

Computed Operating Time - Minutes per Turn, Rubber-tired Skidder Yarding

Vol. per Turn-Bd.Ft. Scrib. Short Log Scale	Vol. Ave. Log 1/ - Bd. Ft. Scribner Short Log Scale	Long Log Scale	No. of 2/ Logs per Turn	Yarding Distance in Feet 3/ 50	100	150	200	250	300	350	400	450	500
200	20	20	10.0	17.94	18.25	18.56	18.87	19.16	19.46	19.74	20.02	20.30	20.57
400	40	40	10.0	18.29	18.61	18.92	19.22	19.52	19.81	20.10	20.38	20.66	20.93
700	70	60	10.0	18.65	18.96	19.27	19.58	19.87	20.17	20.45	20.74	21.01	21.28
870	100	80	8.7	17.04	17.35	17.66	17.96	18.26	18.56	18.84	19.12	19.40	19.67
840	120	100	7.0	14.71	15.03	15.34	15.64	15.94	16.23	16.52	16.80	17.08	17.35
812	140	120	5.8	13.06	13.38	13.68	13.99	14.29	14.58	14.87	15.15	15.42	15.69
850	170	140	5.0	11.97	12.29	12.59	12.90	13.20	13.49	13.78	14.06	14.33	14.60
817	190	160	4.3	10.99	11.30	11.61	11.92	12.22	12.51	12.79	13.08	13.35	13.62
836	220	180	3.8	10.30	10.61	10.92	11.22	11.52	11.81	12.10	12.38	12.66	12.93
806	260	220	3.1	9.33	9.65	9.96	10.26	10.56	10.85	11.14	11.42	11.70	11.97
780	300	260	2.6	8.64	8.95	9.26	9.56	9.86	10.16	10.44	10.72	11.00	11.27
782	340	300	2.3	8.25	8.57	8.87	9.18	9.48	9.77	10.06	10.34	10.61	10.88
777	370	320	2.1	7.95	8.26	8.57	8.87	9.17	9.46	9.75	10.03	10.31	10.58
780	390	340	2.0	7.82	8.14	8.45	8.75	9.05	9.34	9.63	9.91	10.18	10.45
774	430	380	1.8	7.56	7.87	8.18	8.48	8.78	9.07	9.36	9.64	9.92	10.18
750	500	440	1.5	7.10	7.42	7.72	8.03	8.33	8.62	8.91	9.19	9.46	9.73
732	610	560	1.2	6.71	7.03	7.33	7.64	7.94	8.23	8.52	8.80	9.07	9.34
726	660	600	1.1	6.55	6.87	7.18	7.48	7.78	8.07	8.36	8.64	8.91	9.18

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for the Douglas-fir subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.
2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.
3/ Distance logs actually travel from chocker setting point to landing.

Computed Operating Time - Minutes per Turn, Rubber-tired Skidder Yarding (Cont'd.)

Vol. per Turn-Bd.Ft. Scrib. Short Log Scale	Vol. Avg. Log 1/ - Bd. Ft. Scribner Short Log Scale	Long Log Scale	No. of 2/ Logs per Turn	Yarding Distance in Feet 3/ 550	600	650	700	750	800	850	900	950	1000
200	20	20	10.0	20.84	21.10	21.35	21.60	21.84	22.08	22.31	22.54	22.76	22.97
400	40	40	10.0	21.19	21.45	21.70	21.95	22.20	22.43	22.66	22.89	23.11	23.33
700	70	60	10.0	21.55	21.81	22.06	22.31	22.55	22.79	23.02	23.25	23.47	23.68
870	100	80	8.7	19.93	20.19	20.45	20.70	20.94	21.18	21.41	21.63	21.86	22.07
810	120	100	7.0	17.61	17.87	18.12	18.37	18.62	18.85	19.08	19.31	19.53	19.75
812	140	120	5.8	15.96	16.22	16.47	16.72	16.96	17.20	17.43	17.66	17.88	18.09
850	170	140	5.0	14.87	15.13	15.38	15.63	15.87	16.11	16.34	16.57	16.79	17.00
817	190	160	4.3	13.89	14.15	14.40	14.65	14.89	15.13	15.36	15.59	15.81	16.02
836	220	180	3.8	13.19	13.45	13.71	13.96	14.20	14.44	14.67	14.89	15.12	15.33
806	260	220	3.1	12.23	12.49	12.74	12.99	13.24	13.47	13.70	13.93	14.15	14.37
780	300	260	2.6	11.53	11.79	12.05	12.30	12.54	12.78	13.01	13.23	13.46	13.67
782	340	300	2.3	11.15	11.41	11.66	11.91	12.15	12.39	12.62	12.85	13.07	13.28
777	370	320	2.1	10.84	11.10	11.36	11.60	11.85	12.08	12.32	12.54	12.76	12.98
780	390	340	2.0	10.72	10.98	11.23	11.48	11.72	11.96	12.19	12.42	12.64	12.86
774	430	380	1.8	10.45	10.71	10.97	11.21	11.46	11.69	11.93	12.15	12.37	12.59
750	500	440	1.5	10.00	10.26	10.51	10.76	11.00	11.24	11.47	11.70	11.92	12.13
732	610	560	1.2	9.61	9.87	10.12	10.37	10.61	10.85	11.08	11.31	11.53	11.74
726	660	600	1.1	9.45	9.71	9.96	10.21	10.45	10.69	10.92	11.15	11.37	11.59

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for the Douglas-fir subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.
2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.
3/ Distance logs actually travel from choker setting point to landing.

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Rigging, Yarding and Loading

Operations - Commercial Thinnings - Loading

Reference for Cost Table Illustration 2, Table 47
Operating Time and Cost for Light Yarder-Loader (Cold Deck Loading)
Minutes per MBF Gross Volume

Vol. Avg. Log Bd. Ft. Scribner 1/ 16' Log	32' Log	No. 32' Logs/MBF	Direct 2/ Loading Time per 32' Log -Minutes	Direct Loading Time Per MBF -Minutes	Fixed 3/ Loading Time Per MBF -Minutes	Total Loading Time Per MBF -Minutes
10	20	50.0	1.494	74.70	3.59	78.29
20	40	25.0	1.494	37.35	3.59	40.94
35	70	14.3	1.494	21.36	3.59	24.95
50	100	10.0	1.494	14.94	3.59	18.53
60	120	8.3	1.494	12.40	3.59	15.99
70	140	7.1	1.494	10.61	3.59	14.20
85	170	5.9	1.494	8.81	3.59	12.40
95	190	5.3	1.494	7.92	3.59	11.51
110	220	4.5	1.494	6.72	3.59	10.31
125	250	4.0	1.494	5.98	3.59	9.57
130	260	3.8	1.494	5.68	3.59	9.27
140	280	3.6	1.494	5.38	3.59	8.97
150	300	3.3	1.494	4.93	3.59	8.52
160	320	3.1	1.494	4.63	3.59	8.22
170	340	2.9	1.494	4.33	3.59	7.92
185	370	2.7	1.494	4.03	3.59	7.62
195	390	2.6	1.494	3.88	3.59	7.47
205	410	2.4	1.494	3.59	3.59	7.18
215	430	2.3	1.494	3.44	3.59	7.03
230	460	2.2	1.494	3.29	3.59	6.88
240	480	2.1	1.494	3.14	3.59	6.73
250	500	2.0	1.494	2.99	3.59	6.58
260	520	1.9	1.494	2.84	3.59	6.43
270	540	1.9	1.494	2.84	3.59	6.43
280	560	1.8	1.494	2.69	3.59	6.28
290	580	1.7	1.494	2.54	3.59	6.13
295	590	1.7	1.494	2.54	3.59	6.13
305	610	1.6	1.494	2.39	3.59	5.98
320	640	1.6	1.494	2.39	3.59	5.98
330	660	1.5	1.494	2.24	3.59	5.83

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost and Production Studies

1/ Short log scale
2/ From PNW-41: Direct loading time/long log = 1.22 minutes; loading delay factor = 1.123; adjusted direct loading time = 1.494 minutes
Net log weight (from Chart 5, 9333.34B) 53,000 lbs.
Scribner Dec. C wt. equivalent per MBF (from BLM Thinning Handbook) - 11,000+ lbs.
Then: 53,000 lbs. ÷ 11,001 lbs./M = 4.818 MBF per load
3/ From PNW-41: Fixed time per contractor's load - 17.3 minutes;
Then: 17.3 min. - 4.818M = 3.59 minutes per MBF, fixed loading time (Fixed loading time is for positioning, coupling and binding the trailer)

Activity - Road Construction and Maintenance

Operations - Grubbing

Reference for Cost Table Illustration 4, Table 2

Source of Data. Grubbing costs are based upon the removal of 428 stumps from 24" to 88" in diameter by a variety of methods, including conventional blasting, splitting with tractor attachment, and undercutting.

Cost of Materials (used in removal by blasting)

Dynamite (stumping) - 1 1/4 " x 8" @ $0.213/stick

Caps (electric), with 12' lead @ $0.530/cap

Total Grubbing Costs 1/ 2/

D.B.H.	Total Cost per Stump	D.B.H.	Total Cost per Stump
20		64	$43.00
24	$ 7.90	68	46.85
28	9.90	72	50.75
32	12.00	76	54.60
36	15.80	80	58.55
40	19.70	84	62.35
44	23.55	88	66.30
48	27.45	92	70.20
52	31.30	96	74.05
56	35.20	100	78.00
60	39.15		

1/ Cost rather than time was analyzed by d.b.h. because different methods were used to grub stumps; cost was the only common denominator.

2/ Regression equation:
$\hat{Y} = \bar{y} + b(X_i - \bar{x})$
$= a = bX_i$ (where $a = \bar{y} - b\bar{x}$), in which
Y = Cost per stump by d.b.h. class
b = Regression coefficient (0.4128)
X_i = Individual stump diameter (each observation)
$\bar{x}$ = Average stump diameter, all stumps
$\bar{y}$ = Average cost per stump, all stumps

9351.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Road Construction and Maintenance

Operations - Excavation

Reference for Cost Table Illustration 4, Tables 4, 5, 6, 7, 8 and 9

Data Source. Production studies included a range of tractor mounted dozers; however, they have been converted to costs based upon the machine rates of the Caterpillar D8K dozer with ripper as the standard machine. Thus, the cost tables are limited to unit costs. Production rates per minute are omitted.

The typical cross section in the recent studies was unbalanced. On the more gentle side slopes, and on side slopes over 60%, the cross section was a full bench or nearly so. Most excavated material was sidecast and drifted no more than 125 feet. There was no significant relationship between percent side slope and cost per yard. No allowance was made for curve widening excavation.

(a) Common Excavation

Tractor Excavation Cost. Eight road construction studies serve as a basis for cost. Time data have been combined with current operation costs.

Total cost - $22,788.00 ÷ 89,777 cu. yds. = Average cost of $0.254/cu.yd.
Range of typical costs: $0.23 - $0.32/cu.yd.

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost and Production Studies

Common Excavation - Cubic yards per station

% Side Slope	14' Subgrade (10' Usable Width)		20' Subgrade (12' Usable Width)	
	Ave. Center Line Cut	Cubic Yards/ Station	Ave. Center Line Cut	Cubic Yards/ Station
0	---	93	---	130
10	1.0	93	1.2	130
20	1.5	147	2.5	309
30	2.0	220	2.5	346
40	2.7	321	3.0	462
50	2.7	370	4.3	617
60	4.3	485	5.0	768
70	5.0	622	7.0	1,088
80	5.7	763	8.0	1,331
90	6.3	907	9.0	1,636
100	7.0	1,133	10.0	2,045

Common Excavation - Cubic Yards per Turnout 1/

% Side Slope	14' Subgrade (10' Usable Width)			20' Subgrade (12' Usable Width)		
	Ave. Ctr. Line Cut	Cu. Yds./ Station	Cu. Yds./ Turnout	Ave. Ctr. Line Cut	Cu. Yds./ Station	Cu. Yds./ Turnout
0	---	37	28	---	51	77
10	1.3	37	28	1.7	51	77
20	2.0	42	32	3.0	69	104
30	2.7	65	49	3.1	79	119
40	3.5	71	53	4.0	138	207
50	4.7	115	86	5.7	142	213
60	8.0	414	311	10.1	706	1,059
70	12.0	898	674	14.0	1,145	1,718
80	13.2	1,097	822	16.0	1,436	2,154
90	14.8	1,376	1,032	18.0	1,770	2,655
100	17.0	1,660	1,245	20.0	2,085	3,128

1/ Turnout yardage is in addition to excavation for the regular road prism.

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Road Construction and Maintenance

Operations - Excavation

Reference for Cost Table Illustration 4, Tables 4, 5, 6, 7, 8 and 9

(b) Rock Excavation

Costs. Costs are based upon five time studies, including a total of 13,928 cubic yards. The material excavated varied from sandstone to basalt. Costs cover the expense of ripping or drilling and shooting and moving loosened material.

Cost per Yard. The cost per yard ranges from $1.70 to $6.03 Cost appears to be more closely correlated with the amount of rock excavation than with type of rock. The relationship is inverse; i.e., larger volumes may be excavated at smaller unit costs.

Total cost $27091 ÷ 13,928 cu. yds. = $1.95/cu.yd.

Rock Excavation - Cubic Yards per Station

	14' Subgrade (10' Usable Width)		20' Subgrade (12' Usable Width)	
% Side Slope	Ave. Center Line Cut	Cubic Yards/ Station	Ave. Center Line Cut	Cubic Yards Station
0	---	64	---	74
10	1.0	64	0.7	74
20	1.0	86	1.0	119
30	1.5	96	1.5	206
40	2.3	194	2.0	276
50	2.6	263	4.3	509
60	4.2	393	5.0	597
70	4.9	473	7.0	861
80	5.7	569	8.0	990
90	6.2	638	9.0	1,180
100	7.0	735	10.0	1,335

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost and Production Studies

Rock Excavation - Cubic Yards per Turnout

% Side Slope	14' Subgrade (10' Usable Width) Ave. Ctr. Line Cut	Cu. Yds./ Station	Cu. Yds./ Turnout	20 Ft. Subgrade (12' Usable Width) Ave. Ctr. Line Cut	Cu. Yds./ Station	Cu. Yds./ Turnout
0	---	34	26	---	83	125
10	1.3	34	26	1.0	83	125
20	2.0	70	53	2.5	122	183
30	2.8	134	101	3.1	127	191
40	3.5	95	71	4.0	159	239
50	4.7	141	106	5.6	139	209
60	8.0	340	255	10.1	581	872
70	12.0	678	509	14.0	875	1,313
80	13.8	784	588	16.0	1,067	1,600
90	15.0	936	702	18.0	1,197	1,796
100	17.0	1,107	830	20.0	1,399	2,099

Drift Factors - Allowance for Drift Beyond 100 Feet

Determining Percentage Cost Increase

Factor 1/	Average Drift Distance in Feet	Cost Increase in Per Cent 2/
7.5	100	0
5.3	150	42
4.2	200	79
3.3	250	127
2.7	300	178
2.4	350	213

1/ From Caterpillar Performance Handbook - bulldozer production, October 1966. Based on distance from mass center of cut to mass center of fill, using 8S blade.
2/ Percentages apply to the tractor cost only; not applicable to drilling expense, blasting expense, or cost of explosives.

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Road Construction and Maintenance

Operations - Excavation and End Haul With Wheel Scraper

Reference for Cost Table Illustration 4, Table 10

(a) Computation of Cycle Times and Production Rates

Wheel scraper operating at 100% efficiency on 6% effective grade, pay load 16 bank cu. yds.: 1/

Haul Distance (One Way) Feet	Cycle (Round Trip) Time - Minutes	Bank Cu. Yds. Per Hour
500	2.22	433
1,000	2.86	335
1,500	3.48	276
2,000	4.08	236
2,500	4.67	206

Correction for wheel scraper production at 35% efficiency.

Haul Distance (One Way) Feet	Corrected Cycle Time - Minutes	No. of Cycles x 1.8 = Tractor Oper.Time Per Hr. Min.	Min./Hr.	Corrected Production Bank Cu. Yds. Per Hr.
500	6.34	9.46	17.03	151
1,000	8.17	7.34	13.21	117
1,500	9.94	6.04	10.87	97
2,000	11.66	5.15	9.27	82
2,500	13.34	4.50	8.10	72

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost and Production Studies

(b) Computation of D8K Pusher Corrected Rates

0.332

Haul Distance (One Way) Feet	Fixed Cost Per Hour	Operating Time Min./Hr.	x	$0.24 Per = Minute	Corrected Operating Cost/Hr.	Corrected Total Machine Rate
500	$17.25	17.03			$5.65	$22.90
1,000	17.25	13.21			4.38	21.63
1,500	17.25	10.87			3.60	20.85
2,000	17.25	9.27			3.08	20.33
2,500	17.25	8.10			2.69	19.94

1/ Data from Caterpillar Performance Handbook

(c) Determining Cost per Yard

Hauling Distance (One Way) Feet	HOURLY COST						Hourly Prod'n Cubic Yards
	D8K Pusher Total Machine Cost	Wheel Scraper (Rental Rate) Cost	Total Wages	Subtotal Machine and Wage Cost	10% Gen. & Admin. Cost	Total Hourly Cost	
500	$22.90	$41.60	$28.80	$93.30	$9.33	$102.63	151
1,000	21.63	41.60	28.80	92.03	9.20	101.23	117
1,500	20.85	41.60	28.80	91.25	9.12	100.37	97
2,000	20.33	41.60	28.80	90.73	9.07	99.80	82
2,500	19.94	41.60	28.80	90.34	9.03	99.37	72

9353.3 - PRODUCTION COSTS
(Schedule 4)

Cost And Production Studies

Activity - Road Construction and Maintenance

Operations - Shovel Excavation - 3/4 Yard Shovel

Reference for Cost Table Illustration 4, Table 11

Correction for 3/4 Yard Shovel Production at 53% Efficiency

Type of Excavation	Production at 100% Efficiency Cu. Yds./Hour 1/	Correction Factor	Production at 53% Efficiency Cu. Yds./Hour
Easy Digging (Common earth)	135	0.53	72
Rock, Well Blasted	95	0.53	50
Common Excavation w/Rock & Roots	80	0.53	42
Rock, Poorly Blasted	50	0.53	27

Determining Cost per Yard

Excavation	Total Hourly Cost	÷	Hourly Production 53% Efficiency Cu. Yds.	=	Cost per Cu. Yd.
Easy Digging (Common earth)	$43.93		72		$0.610
Rock, Well Blasted	43.93		50		0.879
Common Excavation w/Rock & Roots	43.93		42		1.045
Rock, Poorly Blasted	43.93		27		1.627

1/ From Caterpillar Performance Handbook - based upon bank cubic yard measure.

9353.3 - PRODUCTION COSTS
(Schedule 4)
Cost And Production Studies

Activity - Road Construction and Maintenance

Operations - Culverts

Reference for Cost Table Illustration 4, Tables 13, 14, 15, 16 &17

General

(a) Size. Costs for 18" through 96" sizes are for standard riveted pipe. Costs for large structural plate pipe or pipe arches can be computed; for these it is advisable to use manufacturers' prices current at the time of appraisal.

(b) Gage. Gages shown are those normally sold. If different gages will be used, costs must be adjusted accordingly.

(c) Current Delivered Price. These prices are based upon discounted quotations obtained from manufacturers and represent the cost of culvert delivered to the job. Discount for riveted and helically corrugated culvert is 20 percent; discount for large structural plate culvert is 10 percent. These discounts are for substantial orders of 10,000 pounds or more. Prices will be higher for orders smaller than this. Manufacturers' quotations should be used for the smaller orders.

(d) Connecting Bands. Cost is based upon one band for 36 feet of pipe.

(e) Shop Elliptical Forming. This cost is included in the "Installed Cost per Lineal Foot" for all riveted round pipe 36" in diameter and larger.

(f) Installation. Installation costs were originally suggested by manufacturers. The suggested costs have been adjusted upwards to reflect increased machine and labor costs. Installation costs cover erection of structural plate culverts and "lay, line, and join" operations on standard riveted culverts. These costs are included in the "Installed Cost per Lineal Foot."

(g) Beveling. The costs of beveling are based upon the expense of cuts which will give a 2:1 or less straight or step bevel.

Costs are for beveling both ends of the culverts and cover cutting charges only, without regard for material removed in beveling. Thus, culvert costs should be figured for the entire length of uncut material between bevel ends.

9383.3 - PRODUCTION COSTS
(Schedule 20)
Cost and Production Studies

(h) Installed Price per Foot. This includes all other costs and represents the normal allowances for culvert installation. When strutting or beveling are required, when gage is different or, more or less structural excavation occurs, the "Installed Cost per Lineal Foot" must be adjusted accordingly.

9353. 3 - PRODUCTION COSTS

(Schedule 4)

Activity - Fire Protection and Hazard Reduction

Operations - Slash Burning

Reference for Cost Table Illustration 5, Table 3

Acres	Man Hours per Acre 1/	Total Cost per Acre 2/ 3/
10	3.286	39.11
15	2.714	32.30
20	2.353	28.00
25	2.121	25.24
30	1.966	23.40
40	1.780	21.18
60	1.583	18.84
100	1.298	15.45
150	.952	11.33
200	.607	7.22

1/ Regression equation:
Y = Man hours per acre
$Y = 1.98876 - 00691X_1 + 3.71405X_2$
X_1 = Acres
$X_2 = e^{-.1}$ acres, where, e is the base of natural logarithms and is equal to 2.7182818+.

2/ Total cost is based on a weighted average wage rate of $11.90 per hour.

3/ Total cost includes $0.99 per acre for tractor, torch fuel and tools.

Range of Conditions on Study Areas

(1) All clear cut - 63% high-lead and 37% tractor log
(2) Slope - 0% to 70+%
(3) Aspect
  (a) 34% North
  (b) 26% East
  (c) 25% South
  (d) 15% West
(4) Clear cut acres in sale - 2 to 233 acres
(5) Per cent recovery - 58% to 92%
(6) Slash concentration - light to heavy
(7) Burning conditions - poor to good
(8) Volume per acre - 11 MBF to 116 MBF

9353.3-PRODUCTION COSTS
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION

Operations- FIRE TRAIL CONSTRUCTION - TRACTOR

Reference for Cost Table Illustration 5 Table 4

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1. Tractor D70 Machine Rate	13.30	15.57	28.87
2.			
3.			
4.			
5.			
6.			
Total Machine Rate.....			$ 28.87

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
1. Tractor Operator	14.73	14.73
2.		
3.		

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 14.73

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 43.60 x 10%..... $ 4.36

D. Total Costs ..... $ 47.96

II Misc. Add'l Costs/Adjustments

Production - One mile per 8 hour day

8x 47.96 = $383.68/mile

$383.68 ÷ 52.8 Stations = $7.27/station

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks:

9353.3-PRODUCTION COSTS (C3d)
SCHEDULE 4
Operating Cost Computations

Activity- FIRE PROTECTION

Operations- FIRE TRAIL CONSTRUCTION - Hand Trail

Reference for Cost Table Illustration 5 Table 4

I Determining Hourly Cost

	Fixed	Operating	Total
A. Machine Rates Machine/Time			
1.			
2.			
3.			
4.			
5.			
6.			

Total Machine Rate..... $

B. Wage Rates (Adjusted Hourly Rate) Crew Position/Time		Hour Rate	Total
1.	Labor (64 hours)	64 x 11.44	732.16
2.			
3.			

9353.3-PRODUCTION COSTS
SCHEDULE 4

4. _____ _____ _____

5. _____ _____ _____

6. _____ _____ _____

7. _____ _____ _____

8. _____ _____ _____

Total Wage Rate.....$ 732.16

C. General and Administrative Costs
10% of Machine and Wage Rates

$ 732.16 x 10%..... $ 73.22

D. Total Costs ..... $ 805.38

II Misc. Add'l Costs/Adjustments

Production 64 hours manual labor per mile of hand trail

Cost per mile $805.38

$805.38 ÷ 52.8 Stations = $15.25 per station

III Operating Cost

Total ..... $ _____

Per Hour $ _____

Per Minute $ _____

Remarks: